THE LONG NOW FOUNDATION

THE SALT SUMMARIES

SEMINARS ABOUT LONG-TERM THINKING

BY STEWART BRAND
WITH KEVIN KELLY, ALEXANDER ROSE
AND PAUL SAFFO

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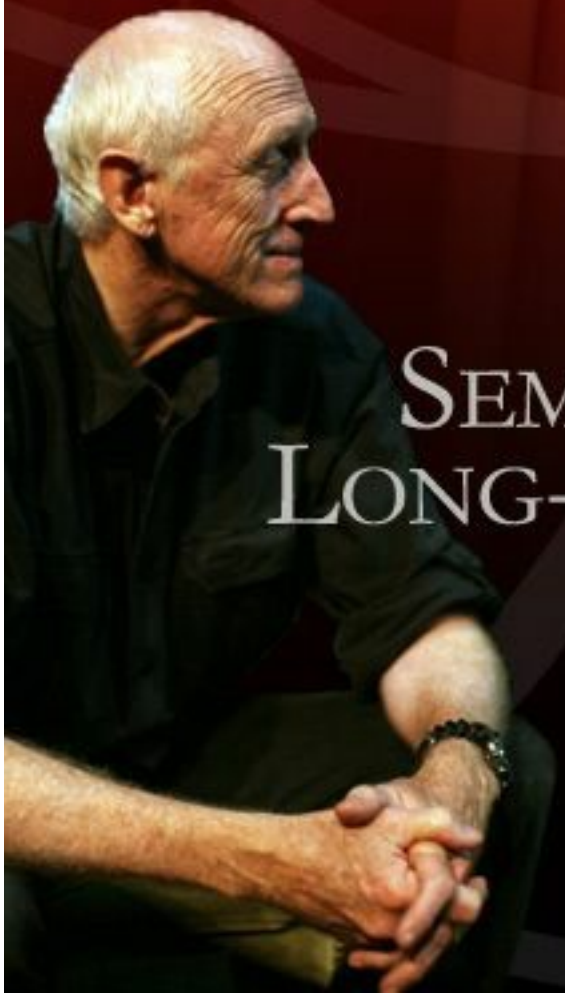

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The SALT Summaries

October 02003 - January 02014

The condensed ideas about long-term thinking of Jared Diamond, Craig Venter, Bruce Sterling, Jill Tarter, Martin Rees, Clay Shirky, Niall Ferguson, Jimmy Wales, Mary Catherine Bateson, Paul Hawken, Vernor Vinge, Ray Kurzweil, Daniel Kahneman, Sam Harris, Will Wright, Orville Schell, Nassim Taleb, Michael Pollan, Wade Davis, Lera Boroditsky, David Eagleman, Richard Rhodes, Paul Romer, Matt Ridley, etc.

by Stewart Brand
with Kevin Kelly, Alexander Rose and Paul Saffo

Foreward by Brian Eno

[SALT stands for Seminars About Long-term Thinking. The SALT talks are organized in San Francisco by The Long Now Foundation.]

Foreward

Written by Brian Eno

> "The Long Now Foundation's monthly Seminars were started in 02003 to build a compelling body of ideas about long-term thinking; to help nudge civilization toward our goal of making long-term thinking automatic and common instead of difficult and rare."

That was the mission statement. Beyond that, there was a suggestion to each of the invited speakers: can you imagine the things you're thinking about now extrapolated over a longer time-frame? What can you tell us about possible futures? By the end of 02011 we will have held the first hundred talks and they're running well: here are some of the most gifted thinkers alive today, showing the leading edge of their thoughts, once a month in San Francisco.

Wonderful, but not the best news for me, because I live in London, 5371 miles distant. And it's 3am. Fortunately, all of the talks are available online to Long Now Members (at longnow.org), and, even more fortunately, after each talk Stewart Brand writes a brief synopsis of it. This is a collection of those synopses.

To me, they are mental gold dust, Rough Guides to Now.

We're living in a sort of intellectual tropics, where, for all sorts of reasons, ideas are breeding and hybridising at an astonishing rate. To have any hope of keeping a handle on it, we need gifted curators, synopsists, synthesizers, filters: people who get to grips with vast chunks of the intellectual landscape and send back comprehensible pictures of what they've found.

Stewart Brand is a great synopsist. He pays attention, registers what's new, and then compresses it into tablet form. I don't think I've ever met

anyone more able to capture such big ideas in so few words. The resulting collection of summaries is an ever-updating gazetteer of where we stand right now - scientifically, technologically, culturally, morally and sociologically. They're food for a lot of thought - Power Bars for the mind.

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Brian Eno

The Long Now

November 14, 02003 http://longnow.org/seminars/02003/nov/14/the-long-now/

Summary

Written by Stewart Brand

The Long Now

Brian told the origins of his realizations about the "small here" versus the "big here" and the "short now" versus the "long now." He noted that the Big Here is pretty well popularized now, with exotic restaurants everywhere, "world" music, globalization, and routine photos of the whole earth. Instant world news and the internet has led to increased empathy worldwide.

But empathy in space has not been matched by empathy in time. If anything, empathy for people to come has decreased. We seem trapped in the Short Now. The present generation enjoys the greatest power in history, but it appears to have the shortest vision in history. That combination is lethal.

Danny Hillis proposed that there's a bug in our thinking about these matters---about long-term responsibility. We need to figure out what the bug is and how to fix it. We're still in an early, fumbling phase of doing that, like the period before the Royal Society in 18th-century England began to figure out science.

Tim O'Reilly gave an example of the kind of precept that can emerge from taking the longer-term seriously. These days shoppers are often checking out goods (trying on clothes, etc.) in regular retail stores but then going online to buy the same goods at some killer discount price. Convenient for the shopper, terrible for the shops, who are going out of business, hurting communities in the process. The aggregate of lots of local, short-term advantage-taking is large-scale, long-term harm. Hence Tim's proposed precept, now spreading on the internet: "Buy where you shop." Ie. When you shop online, buy there. When you shop in shops, buy

there. Four simple words that serve as a reminder to head off accumulative harm.

Leighton Read observed that imagining the future is an acquired skill, and comes in stages. An infant can't imagine the next bottle, or plan for it. A teenager can at most imagine the next six months, and only on a good day; on a rowdy Saturday night, Sunday morning is too remote to grasp. For us adults the distant future is still unimaginable. One thing that Leighton likes about the 10,000-year Clock project is that it lets you imagine a particular part of the very remote future---the Clock ticking away in its mountain---and then you can widen your scope from there, to include climate change over centuries, for example.

Alexander Rose suggested that we should collect examples where a small effort in the present pays off huge in the long term. Tim O'Reilly would like to see us develop a taxonomy of such practices.

Brian's talk Friday night at Fort Mason was a smashing affair. Some 750 people were pried into the Herbst Pavillion, while 400-500 had to be turned away. Eno evidently attracts the sweetest, brightest people---everyone was polite and helpful and patient. The only publicity for the lecture had been email forwarded among friends and posted on blogs, plus one radio show (Michael Krasny's "Forum").

Peter Schwartz

The Art Of The Really Long View

December 12, 02003 http://longnow.org/seminars/02003/dec/12/the-art-of-the-really-long-view/

Summary

Written by Stewart Brand

The art of the really long view

For such a weighty subject there was a lot of guffawing going on in the Seminar Thursday night.

The topic was "The Art of the Really Long View." Peter Schwartz chatted through his slides for tonight's lecture, then the discussion waded in. Present were Danny Hillis, Leighton Read, Angie Thieriot, Ryan Phelan, David Rumsey, Eric Greenberg, Kevin Kelly, Anders Hove, Schwartz, and me.

The event was very well audio and video taped, so we can link you to a fuller version later. For now, here's a few of my notes.

Much of discussion circled around Schwartz's assertion that the most durable and influential of human artifacts are IDEAS. And a distinction worth drawing is between POWERFUL ideas and GOOD ideas. Not all powerful ideas turn out to be good, in the long run. For example, Schwartz proposed that monotheism has been an extremely powerful idea, dominating all kinds of human activity for millennia, but its overall goodness is increasingly questionable.

Or take the powerful idea of Communism and the powerful idea of Capitalism. Looking at them when both were being touted as world solutions around, say, 1890, how would you distinguish which one was likelier to play out as good? Most of us, then, would probably have given the nod to Communism, particularly in light of robber-baron excesses in the US, etc.

Danny Hillis proposed that bad powerful ideas are essentially collective

hallucinations which mask reality, whereas good powerful ideas have built into them all kinds of reality checks. So Capitalism---expressed as markets---has prevailed so far because it is an emergent, distributed, out-of-control feedback system.

Some notable quotes (among many):

"The future is the ONLY thing we can do anything about." --Hillis

"Denial is a special case of optimism." --Leighton Read.

Revisiting Long Now's frequent chant that multiplying options is the great good to do for future generations, we examined the idea of "toxic choice"---for instance the stupefying multiplicity of choices in a supermarket or department store that make you long for a good boutique. "But lots of boutiques," said Ryan Phelan. "I've got it! " said Read, "We'll have two big toxic choice emporiums, connected by a bunch of boutiques! I think we've just invented the mall."

Contemplating work to be done, Schwartz said: "We know it would be a good idea to have the rule of law extended to include ecological systems, but we haven't figured out how to make that a powerful idea yet."

George Dyson

There's Plenty of Room at the Top: Long-term Thinking About Large-scale Computing

January 9, 02004 http://longnow.org/seminars/02004/jan/09/theres-plenty-of-room-at-the-top/

Summary

Written by Stewart Brand

Long-term thinking about large-scale computing

Ever since his 1997 breakthrough book, *Darwin Among the Machines*, Dyson has become regarded as a leading historian and interpreter of computer science, bringing a rigorous and unconventional perspective. Thus his willingness to examine the long-term prospects for mega-scale computing. Most computer people are averse to discussing seriously any future beyond ten years.

With the Dyson seminar, our series begins to get down to specific cases of applying long-term thinking.

"Your now is only as long as you remember. To way to understand the future is give the present more depth," said George Dyson at the start of his Seminar at Long Now last Thursday. Then he proceeded to help us remember what really went on at the very beginning of computerdom, back in 1947 at Princeton's Institute for Advanced Study (IAS) when John von Neumann and colleagues were inventing the digital world.

Thanks to his physicist/mathematician father Freeman, George grew up at the IAS, along with his older sister Esther. Last year he went back to spend an entire year burrowing through the ancient files and logbooks of the von Neumann period. A skilled photographer, he has hundreds of richly evocative photos of those records to show. In them the past comes to life. Nion McEvoy said George's artifacts are deep and consequential, like relics from earliest Christianity.

The artifacts showed that at the beginning the code was small and sound and the machines (vacuum tubes and oscilloscope tubes) were maddenly flaky. By the end of that period the machines had become reliable, and

most of the problems were in the ever-growing code. Von Neumann wrote a landmark paper, "Reliable Organizations of Unreliable Elements."

Strings of bits (then still called binary digits) come in two forms, Dyson reminded us---sequential in time and structural in space. The sequences make things happen; stored as structure they are memory. Building an architecture that would manage the transitions adroitly and also scale up radically for decades was a profound achievement.

Engineers were never particularly welcome at the IAS. One letter shows an administrator complaining that the computer people from the basement were using excessive quantities of sugar and tea, and doing so at all hours of the night. Programmers evidently have been caffeine and sugar swilling nocturnal troglodytes from the very start.

Like Eniac, the IAS computer was mainly used for atomic bomb studies---that's where the money came from. The researchers also worked on weather prediction (with approaches still in use, only now they're fast enough to predict the future instead of the past), and von Neumann assumed we would eventually use them to control the weather---an assumption George shares.

By 1953 at the IAS Nils Barricelli was working on "Symbiogenetic Evolution Processes Realized by Artificial Methods," running the first artificial life programs. (Their source code is still around and could come to life again.) Danny Hillis, who has also done a-life experiments, noted that there are no seriously long-lived computations going on (max is a year, for prime numbers and the like). Maybe Long Now should start some.

George ended by looking at the larger picture. He said that computation at present is still parasitic on us, but it probably is in the process of becoming part of life itself---it's just another system of genetics.

Evolution, after all, is massively parallel computation, and now the world of code is evolving, perhaps to reshape the tree of life itself. As von Neumann's famous work on Theory of Games showed, coalitions are the most important element.

"The great collective organism we're becoming part of will have a completely different sense of time."

James Dewar

Long-term Policy Analysis

February 13, 02004 http://longnow.org/seminars/02004/feb/13/long-term-policy-analysis/

Summary

Written by Stewart Brand

Long-term policy analysis

Dewar is head of RAND's Pardee Center on very long-term policy—35 to 200 years

For over half a century the RAND Corporation has influenced national policy and invented major intellectual tools. Packet switching (Paul Baran) came from RAND; so did scenario planning (Herman Kahn); so does the current understanding of "net warfare" (John Arquilla). For all of its power, RAND's thinkers are seldom heard in public.

Three years ago RAND set out to engage serious long-term thinking. A RAND alum funded the Pardee Center for Longer Range Global Policy and the Future Human Condition, with the charge "to improve our ability to think about the longer-range future–from 35 to as far as 200 years ahead." Selected to run the new center was 22-year-RAND-veteran James Dewar.

Jim Dewar from RAND laid out a persuasive case for long-term thinking and planning at the Seminar last Thursday.

Examples of successful long-term planning include:

- The US Constitution
- Panama Canal
- Transcontinental railroad in the US
- Marshall Plan
- Bismarck's unification of Germany
- George Kennan's policy of "containment" of the USSR
- US Social Security plan—cemented in place with a card for every

citizen, by clever Roosevelt
- FCC wisely helping the US phone system connect to computers
- Leighton Read noted that all these examples emerged from traumatic conditions.

As for an example of "getting it right about getting it wrong," Dewar cited Keynes's 1919 book, *The Economic Consequences of the Peace*, about how taking revenge on the defeated Germans would lead to another war. It did. The next time, the Allies took Keynes's advice, and that was the Marshall Plan.

Historian David Lowenthal, a guest at the seminar, observed that no publisher would take Keynes's book, so he published it himself, and made $2 million on it.

Unpacking the idea of Long-Term Policy Analysis (LPTA), Dewar stated that "long-term" means "characterized by deep uncertainty"—typically including uncertainty at the systemic level (structure), uncertainty about likelihood of which way events might go, uncertainty about the migration of values, and uncertainty about what are proper goals.

Leighton Read suggested we should build a detailed taxonomy of the various kinds of uncertainties about the future.

Dewar observed that one of the greatest difficulties of doing long-term policy analysis is GETTING THE ATTENTION of policy makers. Peter Schwartz recalled that at Royal Dutch/Shell he had extensive profiles on all the managing directors of Shell—his direct customers for scenario planning—so he could tailor the work to their interests.

Both Dewar and David Lowenthal noted that policy makers find it much easier to take on known, existing problems that to work on emerging problems that are not defined yet. They're great at "pound of cure," terrible at "ounce of prevention." That's what long-term policy analysis

has to fix.

Dewar showed slides of a technique his center at RAND is developing to run models using thousands of scenarios, but what he was showing seemed incomprehensible, so the seminar group challenged it strongly. This was tremendously helpful for the lecture the following evening, where Dewar made the same slides very compelling by spelling out a case—involving the tradeoffs of various forms of taxing polluters against joint gains in economic growth AND "decoupling" that growth from environmental harm.

Rusty Schweickart

The Asteroid Threat Over the Next 100,000 Years

March 12, 02004 http://longnow.org/seminars/02004/mar/12/the-asteroid-threat-over-the-next-100000-years/

Summary

Written by Stewart Brand

Asteroid threat report

Schweickart filled the hall with some 240 at the Presidio Officers Club and gave a dazzling lecture. He left the next day for Washington DC to lobby Congress to apply its will to making the Earth safe for the very long term.

"For life to survive in planetary systems," said Schweickart, "it has to figure out how to deal with massive asteroid impacts. Who knows how many advanced life forms in the universe have failed or passed that test. Humanity is just now on that cusp. We have the knowledge and the ability---if not yet the will---to prevent future large-scale extinction events from asteroids."

Data-rich, graphics-rich, and huge in conceptual scale, it was the most long-now Seminar yet---"The Asteroid Threat Over the Next 100,000 Years."

Impact craters everywhere---Moon, Mercury, Mars; even asteroids have craters from other asteroids. (And occasional comets---1% of the source of impacts is from comets, as we saw very recently when a fragmented comet carpet-bombed Jupiter.) "How many asteroids are in the asteroid belt between Mars and Jupiter? Pick a number. But if it doesn't have at least nine zeroes after it, it's wrong."

Rusty's presentation was full of lore. Most asteroids are stone, but they are light---they absorb impact like Styrofoam. There are 100,000 shooting stars every night on Earth---small asteroids. Meteorites are COLD when they land, not hot (the deep cold of space is preserved, while the air-friction hot surface ablates away.) Air bursts from large asteroids

cause more damage than ground strikes, and ocean impacts can cause tremendously destructive tsunamis. With really large impacts, the planets exchange material---Mars rocks on Earth, Earth rocks on Mars.

When the last major-extinction impact occurred in Yucatan 65 million years ago, 10% of the stupendous blast debris exploded clear away from the Earth, while the other 90% rained down incandescent with re-entry all over the Earth for 90 minutes of burning sky---everything flammable on Earth burned up, and one meter of the oceans boiled off. (That was a 10-kilometer asteroid; when a 200-kilometer asteroid hits, it boils off the whole oceans). Then there was no sunlight for several years. 65% of all species on Earth ceased to exist, including the super-dominant dinosaurs. They failed the asteroid test.

Rusty showed a diagram with all important asteroid data in it. The power-law distribution (many small, few large) is so perfect you can directly correlate frequency of impact with size of asteroid and energy released in megatons and the damage that would result. (Calibration: the largest nuclear weapon tested was a Soviet bomb of 58 megatons---6,000 times the force of the Hiroshima bomb. The 1908 air-burst of an asteroid over Tunguska, Siberia, made an 11-megaton explosion that flattened 2,100 square kilometers of forest.)

"The asteroid threat over the next 100,000 years is right there in the chart," said Rusty. In the next hundred millennia:

- There's a 10% chance of an asteroid causing planet-scale damage with 100,000 megatons of energy released.
- There's a 50-50 chance of a 500-meter asteroid that could destroy an area the size of Texas with a 6,000 megaton explosion---100 times the USSR's biggest bomb.
- There will be about TEN 200-meter asteroid impacts, good for 400 megatons.
- There will be about A HUNDRED 70-meter-diameter asteroids, each

causing 15 megatons of damage (i.e. worse than the Tunguska explosion, which would have wiped out all of London if it had hit there instead of the remote wilderness).

NASA's Space Guard program has been looking for PHA's---Potentially Hazardous Asteroids---that are 1 kilometer or more in diameter. There are about 1,100 of them---700 have been detected and tracked and found innocent of threat; that leaves some 400 still unknown. Since asteroids orbit with the Earth around the Sun, any collision path is gradually convergent. Advance knowledge of collision with a very large asteroid can range from 40 years to 2 years, with the kind of attention now being paid.

Extreme case: "1950DA" is an asteroid that has been tracked since 1950. Its orbit is so precisely known that we can forecast there is a 1-in-300 chance it will collide with Earth on March 16, 2880---876 years from this month. Orbital mechanics are destiny.

One of the sponsors of the SALT series, Leighton Read, noted that the asteroid threat is a rare instance where we really CAN predict the future, a very long way out and in great detail, at least statistically.

Furthermore, this is a rare instance where we really can do something about the future. Threatening asteroids can not only be detected, they can be deflected.

Rusty said there are two main approaches to deflection---sudden impulse (like a nuclear explosion), and slow, guided redirection. He favors the second, and lead-authored an article in last November's SCIENTIFIC AMERICAN on the design and use of an "asteroid tugboat." He noted that some of those favoring nuclear deflectors have an agenda of weaponizing space and see this as a dual-use back door to something now thoroughly forbidden by treaties.

Rusty heads the B612 Foundation (named for the Little Prince's asteroid), which is lobbying to add asteroid deflection to NASA's Prometheus mission to Jupiter's icy moons, planned for around 2015. The tugboat would have an ion or plasma drive (highly efficient) powered by a nuclear reactor.

Asteroids spin, and they are extremely massive. Moving them where you want is tricky. The evening before the talk, Danny Hillis jarred Rusty by suggesting a "tractor beam"---use the gravitational attraction between the tug and the asteroid to "pull" the spinning asteroid without have to touch it. It turned out that one of Rusty's colleagues had come up with exactly the same idea several weeks ago. To make an asteroid miss the Earth, all you have to do is add or subtract 40 seconds from a 2-year orbit---1/200th of a mph of a rock traveling at some 66,000 mph. Big rock, though.

Daniel Janzen

Third World Conservation: It's ALL Gardening

April 9, 02004 http://longnow.org/seminars/02004/apr/09/third-world-conservation-its-all-gardening/

Summary

Written by Stewart Brand

Mega gardening

Big as life and twice as opinionated, the renowned preservation biologist Daniel Janzen spoke for The Long Now on Friday, April 9, 2005. His perspective on preservation may be jarring to some: “It’s ALL Gardening”.

Dan Janzen is most widely known for his heroic efforts helping set all of Costa Rica on a preservation path, ensuring that the mega-diverse nation continues indefinitely as a haven for science and eco-tourism. His particular focus, Guanacaste Conservation Area, was recently declared a World Heritage Site by UNESCO. His ongoing work there in field taxonomy and innovative preservation practices led to his receiving the Crafoord Prize (1984), the Kyoto Prize (1997), and the Albert Einstein Science Prize (2002). Professor Janzen teaches at the University of Pennsylvania.

David Rumsey

Mapping Time

May 14, 02004 http://longnow.org/seminars/02004/may/14/mapping-time/

Summary

Written by Stewart Brand

Maps and time

David Rumsey's spectacularly illustrated lecture, "Mapping Time" is not just about maps. It is the future of data and knowledge handling. People literally gasp at the things Rumsey shows can be done.

I love it when techies, artists, and historians all gasp at the same time. That happened with David Rumsey's spectacularly illustrated Seminar About Long-term Thinking on May 13-14, "Mapping Time."

Once an artist, long a real estate success, now one of the world's leading historic map collectors and THE leading online map innovator, David Rumsey gives an exceptionally deft graphic talk. Complex and elegant things kept happening with his images, always on cue with never a hesitation or false move. I've never seen a tighter weaving of ideas, words, and persuasive images.

You can find everything he talked about and more at his website:

http://www.davidrumsey.com

Maps define worlds, Rumsey said. Compare the Spanish and British maps of the years of discovery in the New World. Because the Spanish maps and charts were kept as state secrets, their voluminous naming of rivers and mountains and so on didn't last. The British proudly published all their discovery maps as a proof of ownership. Their names are the ones that still adorn the land.

The combination of the Web and GIS (Geographic Information Systems) has utterly transformed the world of maps. When Rumsey contemplated donating his collection of historic maps to a library or museum, he

learned that they would be hidden carefully away in some vault, and almost no one would see them. So instead he put the collection online—inventing new super-high-resolution imaging systems and new browsers that could read the multi-gigabyte images. His site now gets two million visitors a year. Stanford's excellent map library gets six thousand users a year.

Nothing shows the value of high resolution as well as maps, said Rumsey. For example, he was able to take the 110 separate sheets of a bird's-eye view of late 19th Century St. Louis and in a "digital knitting project" connect them all into one vast, beautiful image. There are two TERAbytes of data on his website. Because the files are too large to download, he invented browsers that can explore and compare them.

It's the comparison tools that are shocking. Thanks to GIS, Rumsey can take old somewhat incorrect maps and "geo-rectify" them, using "rubber-sheeting" software tools he developed, so that the old maps can overlay perfectly on current precisely accurate maps. He demonstrated with four maps and an aerial photo of the San Francisco waterfront area where he was giving the talk. Starting with the old map, he faded up through the sequence of maps to the present, and you saw the city build in exquisite detail. Then he popped the four maps into four separate windows and scrolled them all in synch.

Take Lewis and Clark's hand-drawn maps of the Missouri River from 1805. Once geo-rectified, you can use them for navigating now, GPS in hand.

Tim O'Reilly commented, "This means that old maps are no longer 'wrong.' The past is not a mistake. You can add new information to an old document in a way that keeps it perpetually valuable."

Rumsey demo-ed some other features of his site, such as his way of empowering serendipity by providing a "ticker"—a crawl of random

images from his collections (and now other collections, including art) scrolling along the bottom of the screen. Click on anything enticing, and off you go to explore it.

He said that getting totally covered by Google was essential—"Google is the ultimate catalog." Once fully linked on Google, his traffic took off from 2,000 visitors a day to 7,000.

Then Rumsey showed what happens when you "drape" his maps over a raised-relief topological version of the landscape. You can view it obliquely. You can fly through it! As you fly through it, you can flick from one historic version of the landscape to another! This is where the gasps took over.

To my mind, Rumsey's dynamic layering tools for visual data are new tool of thought, one that will become common. They are a compelling new way to think in time.

All of Rumsey's maps can be perused totally for free. We asked him how much it costs to run his incredible operation. He said it's maybe 3 or 400K a year. Where does the money come from? From him. David Rumsey is one of the most impressive just-do-it philanthropists I've ever met. He is having more fun with his money and his time and the world than just about anyone.

Bruce Sterling

The Singularity: Your Future as a Black Hole

June 11, 02004 http://longnow.org/seminars/02004/jun/11/the-singularity-your-future-as-a-black-hole/

Summary

Written by Stewart Brand

Your future as a black hole

One reason lots of people don't want to think long term these days is because technology keeps accelerating so rapidly, we assume the world will become unrecognizable in a few years and then move on to unimaginable. Long-term thinking must be either impossible or irrelevant.

The commonest shorthand term for the runaway acceleration of technology is "the Singularity"—a concept introduced by science fiction writer Vernor Vinge in 1984. The term has been enthusiastically embraced by technology historians, futurists, extropians, and various trans-humanists and post-humanists, who have generated variants such as "the techno-rapture," "the Spike," etc.

It takes a science fiction writer to critique a science fiction idea.

Along with being one of America's leading science fiction writers and technology journalists, Bruce Sterling is a celebrated speaker armed with lethal wit. His books include *The Zenith Angle* (just out), *Hacker Crackdown*, *Holy Fire*, *Distraction*, *Mirrorshades* (cyberpunk compendium), *Schismatrix*, *The Difference Engine* (with William Gibson), *Tomorrow Now*, and *Islands in the Net*.

The Seminar About Long-term Thinking on June 10-11 was Bruce Sterling examining "The Singularity: Your Future as a Black Hole." He treated the subject of hyper-acceleration of technology as a genuine threat worth alleviating and as a fond fantasy worth cruel dismemberment.

Sterling noted that the first stating of the Singularity metaphor and threat

came from John Von Neuman in the 1950s in conversation with Stan Ulam—"the rate of change in technology accelerates until it is mind-boggling and beyond social control or even comprehension." But it was science fiction writer Vernor Vinge who first published the idea, in novels and a lecture in the early 1980s, and it was based on the expectation of artificial intelligence surpassing human intelligence. Vinge wrote: "I believe that the creation of greater than human intelligence will occur during the next thirty years. I'll be surprised if this event occurs before 2005 or after 2030." Vinge was not thrilled at the prospect.

The world-changing event would happen relatively soon, it would be sudden, and it would be irrevocable.

"It's an end-of-history notion," Sterling drawled, "and like most end-of-history notions, it is showing its age." It's almost 2005, and the world is still intelligible. Computer networks have accelerated wildly, but water networks haven't—in fact we're facing a shortage of water.

The Singularity feels like a 90s dot-com bubble idea now—it has no business model. "Like most paradoxes it is a problem of definitional systems involving sci-fi handwaving around this magic term 'intelligence.' If you fail to define your terms, it is very easy to divide by zero and reach infinite exponential speed." It was catnip for the intelligentsia: "Wow, if we smart guys were more like we already are, we'd be godlike."

Can we find any previous Singularity-like events in history? Sterling identified three—the atomic bomb, LSD, and computer viruses. The bomb was sudden and world changing and hopeful—a new era! LSD does FEEL like it's world changing. Viruses proliferate exponentially on the net. LSD is pretty much gone now. Mr. Atom turned out to be not our friend and has blended in with other tools and problems.

Singularity proponents, Sterling observed, are organized pretty much like virus writers—loose association, passionate focus, but basically gentle. (They'd be easily rounded up.) "They don't have to work very hard because they are mesmerized by the autocatalyzing cascade effect. 'Never mind motivating voters, raising funds, or persuading the press; we've got a mathematician's smooth line on a 2D graph! Why bother, since pretty soon we'll be SUPERHUMAN. It's bound to happen to us because we are EARLY ADAPTERS.'"

Vernor Vinge wrote: "For me, superhumanity is the essence of the Singularity. Without that we would get a glut of technical riches, never properly absorbed." Said Sterling, "A glut of technical riches never properly absorbed sounds like a great description of the current historical epoch."

Sterling listed five kinds of kinds of reactions to the Singularity. 1) Don't know and don't care (most people). 2) The superbian transhumanists. 3) The passive singularitatians—the Rapture of the Nerds. 4) The terrified handflapping apocalypse millennialists (a dwindling group, too modish to stay scared of the same apocalypse for long). 5) The Singularity resistance—Bill Joy killjoys who favor selective relinquishment. Sterling turned out to be a fellow traveler of the Resistance: "Human cognition becoming industrialized is something I actually worry about."

Vinge did a great thing, said Sterling. The Singularity has proved to be a rich idea. "In the genre of science fiction it is more important to be fruitfully mistaken than dully accurate. That's why we are science fiction writers, not scientists."

Suppose some kind of Singularity does come about. Even though it is formally unthinkable to characterize post-Singularity reality, Sterling proposed you could probably be sure of some things. The people there wouldn't feel like they are "post"-anything. For them, most things would be banal. There wouldn't be one Singularity but different ones on

different schedules, and they would keep on coming. It would be messy. Death would continue as the great leveler.

Suppose humanity elected to slow down an approaching Singularity to a manageable pace, what could we actually do? How do you stop a runaway technology?

—You could reverse the order of scientific prestige from honoring the most dangerous new science (such as nuclear physics) to honoring the most responsible restraint—a Relinquishment Nobel. It would be scientific self-regulation.

—You could destroy scientific prestige through commercialization. Scientists diminish into mercenaries—"put-upon Dilberts and top-secret mandarins." It would still be dangerous, though.

—Have a few cities leveled by a Singularity technology and you could bounce into world government with intense surveillance and severe repression of suspect technologies and technologists. Most societies are already anti-science; this would fulfill their world view. "You can run but you can't hide! You will be brought to justice or justice will be brought to you! Into the steel cage, Mr. Singularity. Into Guantanamo till you tell us who your friends are. Then they join you in there." Or maybe it's not that fierce, and it's all done by benevolent non-governmental organizations.

Sterling concluded: "It does come down to a better way to engage with the passage of time. The loss of the future is becoming acute. The most effective political actors on the planet right now are guys who want to blow themselves up—they really DON'T want to get out of bed in the morning and face another day. People need a motivating vision of what comes next and the awareness that more will happen after that, that the future is a process not a destination. The future is a verb, not a noun. Our minds may reach the ends of their tethers, but we'll never stop futuring."

Jill Tarter

The Search for Extra-terrestrial Intelligence: Necessarily a Long-term Strategy

July 9, 02004 http://longnow.org/seminars/02004/jul/09/the-search-for-extra-terrestrial-intelligence-necessarily-a-long-term-strategy/

Summary

Written by Stewart Brand

The long search

“The Search for Extra-Terrestrial Intelligence: Necessarily a Long-term Strategy” is the title for Jill Tarter’s Seminar About Long-term Thinking this Friday. There’s no deeper question than “Are we alone in the universe?” And there’s no quick way to answer it. Slow, steady science is the hardest to fund and organize, but Jill Tarter has been working on the question for 30 years and the SETI Institute (which she co-founded) for 20 years. The work has had incremental jumps in capacity, such as with the seti@home program (the first major peer-to-peer application) and with the Allen Telescope Array, coming on line later this year.

Jill Tarter holds the Bernard Oliver chair and directs the Center for SETI Research at the SETI Institute in Mountain View. Interested in the subject since the mid-70s, Dr. Tarter first published on SETI in 1977. Recipient of numerous prizes and awards, Dr. Tarter has lately expanded her activities to include helping educate the next generation of scientists. She was the model for the Ellie Alloway character in Carl Sagan’s 1985 novel *Contact* and the 1997 movie starring Jodie Foster.

“We are the first generation of humans who can investigate for signs of other intelligences in the universe,” began Jill Tarter at the July 8-9 Seminar About Long-term Thinking. All we have to find is one case for the universe to appear utterly different to us, because finding one will guarantee there are many.

“Anybody we find,” she went on, “will be older than we are. SETI was rightly characterized right back at the beginning of the idea in 1959 as ‘archaeology of the future’— their past, our future.”

“We can’t detect intelligence at a distance, so really SETI is SETT— the Search for Extra-terrestrial TECHNOLOGY.” Jill thinks that the technological Singularity feared by some won’t happen, “because in nature all exponential growths saturate at some point.” If, however, technologies always self-extinguish, then we will find no one (and presumably we will eventually join the great silence). But if technologies at least sometimes stabilize, or even keep on accelerating, and they bother to communicate, we could gradually build a catalog of the ways technology can develop, to better guide our own.

In Earth’s history inferior technologies have always been crushed by the “guns, germs, and steel” of superior technologies. Isn’t contacting civilizations certain to be superior to ours asking for serious trouble? You can’t catch a cold through the phone, Jill pointed out. The effect of ET contact is more likely to be what Europe experienced when it reached back in time for the culture, science, and technology of the Classical era (and across Asia via the Mongol Empire for the “compass, gunpowder, and printing” of China): the result of those contacts was the Renaissance.

As Jill chronicled the history of SETI, I was impressed at how limited the search has been so far, even though 101 targeted and survey searches have been reported since around 1974. If the nearest star, Alpha Centauri, were leaking TV and radio signals like Earth is, we would not detect it— yet. The SETI Institute is now building at Hat Creek, California, a 300-times improvement on previous search technology— the Allen Telescope Array (initially funded by Paul Allen; $16 million is needed to complete it). It will have 350 ingenious dishes (designed by Jill’s husband Jack Welch) arrayed in a Gaussian random pattern. The next stage would be a Square Kilometer Array, offering 100-times better still power, for a cost of $1 billion. Then really good listening could be done from the far side of the Moon (”the only place in the Solar System not exposed to Earth’s electronic noise”).

Jill’s catalog of search technology to come (she’s a self-confessed

hardware geek) had a piece of stunning news, at least to me. If computation keeps getting better and our radio-telescopy keeps improving, we should know by 2040 whether or not there's anyone out there, at least in our galaxy. That's soon! And huge.

On of Jill's slides quoted cartoonist Walt Kelly (via Porkypine): "Thar's only two possibilities: Thar is life out there in the universe which is smarter than we are, or we're the most intelligent life in the universe. Either way, it's a mighty sobering thought."

What about Earth transmitting instead of just listening? Jill noted that for a signal to go out and be answered could take up to 200,00 years. (That's within our galaxy; for the next galaxy over it would be millions of years.) She ended her talk: "Who should talk for Earth? The winders of the Clock of the Long Now. What should they say? The Library of human culture. You could call it… 'the long hello.'"

Phillip Longman

The Depopulation Problem

August 13, 02004 http://longnow.org/seminars/02004/aug/13/the-depopulation-problem/

Summary

Written by Stewart Brand

The depopulation problem

Full PDF of the talk here, slideshow here.

No need to summarize this time. Phillip Longman wrote out his whole talk, with the illustrations more viewable even than they were at the Seminar and talk. (excerpt below)

It is full of rethink-the-news sentences like: “Notice that Japan’s lengthening recession began just as continuously falling fertility rates at last caused its working-age population to begin shrinking in relative size.”

One thing worth adding from the Q&A at Phil’s public lecture August 13th. Kevin Kelly asked him what he thought the world might feel like in 100 years.

“People a century from now will have so few blood relatives I think it could be very lonely.” The audience, convinced by then, was utterly still.

Excerpt from Longman's talk:

"So where will the children of the future come from? Some biologists speculate that modern human beings have created an environment in which the “fittest”, or most successful, individuals are precisely those who have few, if any, offspring. As more and more humans find themselves living under conditions in which children have become costly impediments to success, those who are well adapted to this new environment will tend not to reproduce themselves. And many others who are not so successful will imitate them.

But this hardly implies extinction. Some people will still have children. They just won’t be people highly motivated by material concerns or secular values. Disproportionately, the parents of the future will be people who are at odds with the modern environment – people who either “don’t get” the new rules of the game that make large families a liability or who, out of religious or chauvinistic conviction, reject the game altogether. In short people like Mormons. "

Danny Hillis

Progress on the 10,000-year Clock

September 10, 02004
http://longnow.org/seminars/02004/sep/10/progress-on-the-10000-year-clock/

Summary

Written by Stewart Brand

“How’s the Clock coming?” Everyone connected with The Long Now Foundation or with Danny Hillis hears that question all the time.

“Progress on the 10,000-Year Clock,” Danny Hillis — Friday, September 10, 7pm, Fort Mason Conference Center, San Francisco. Doors open for coffee and books at 7pm; lecture is promptly at 8pm. You may want to come early to be sure of a seat. Admission is free (donation of $10 very welcome, not required).

Planned as an art/engineering work of heroic scale inside a Nevada mountain, the 10K Clock is meant to embody and inspire long-term thinking. The first working prototype was completed in 2000 and now ticks sedately away (one tick per minute) in London at the Science Museum (the Queen came to the opening). The second working prototype is nearing completion. Meanwhile the designated mountain— Mt. Washington, 11,600 feet high in eastern Nevada— is being explored in depth. If all goes well, construction of the Mountain Clock could begin soon.

Co-founder and co-chair of The Long Now Foundation, Danny Hillis is an inventor, scientist, author, and engineer. He pioneered the concept of parallel computers that is now the basis for most supercomputers, as well as the RAID disk array technology used to store large databases. He is co-chair and chief technology officer at Applied Minds. Before that he was a vice president and Fellow at Disney. Before that he co-founded Thinking Machines, which built the first massively parallel supercomputers. (Full bio here.)

Paul Hawken

The Long Green

October 15, 02004 http://longnow.org/seminars/02004/oct/15/the-long-green/

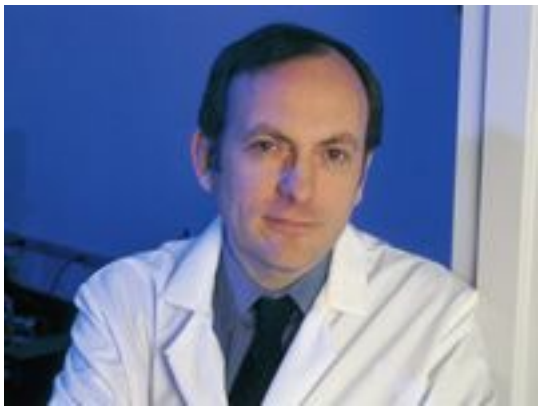
Summary

Written by Stewart Brand

The long green

The environmental movement has moved on. It has become so deep and wide that it adds up to something new entirely, still unnamed. Whatever it is, it is now the largest movement in the world and the least ideological. Driven by science and patience, it is civilization-scale therapy.

Paul Hawken co-authored the now classic *Natural Capitalism* with Amory Lovins and also wrote *The Ecology of Commerce* and *Growing a Business*. He co-founded a great garden company, Smith & Hawken, and a great organic food company, Erewhon. He chaired the introduction of The Natural Step to the US and currently is creating several companies for Pax Scientific.



Michael West

The Prospects of Human Life Extension

November 12, 02004 http://longnow.org/seminars/02004/nov/12/the-prospects-of-human-life-extension/

Summary

Written by Stewart Brand

Ever longer life

Our germline cells (eggs and sperm) are already immortal. What if the rest of the cells of our body could acquire the same ability? Tissue by tissue, one degenerative disease after another, it could gradually happen in the course of one or two human generations. When it does happen, what we mean by “generation” changes completely.

Thanks to Proposition 71, which funds embryonic stem cell research, California is now the frontier of the key technology for rejuvenating human cells, tissues, and organs; for not just treating but curing lethal diseases. Michael West, founder of Geron and Advanced Cell Technology, has been in the thick of regenerative biomedicine since the early ’90s.

As soon as normal human life spans begin to increase beyond 100 years, on purpose, everything we think and do will change.

Will it really happen? If so, how soon?

Michael West has been in the thick of cures for human aging since his work on telomerase and the founding of Geron in the 1990s. Now, as chair and CEO of Advanced Cell Technology, he is a leader in the use of embryonic stem cells and cloning for the regeneration of aging tissue and organs. He is author of *The Immortal Cell: One Scientist’s Quest to Solve the Mystery of Human Aging*.

Ken Dychtwald

The Consequences of Human Life Extension

December 3, 02004 http://longnow.org/seminars/02004/dec/03/the-consequences-of-human-life-extension/

Summary

Written by Stewart Brand

What long life means

Ken Dychtwald gave a terrific talk Friday evening to a standing-room audience on “The Consequences of Human Life Extension.”

The growing—and soon overwhelming—prevalence of the old in developed nations is leading to a “new old.” Ken described meeting a bright-eyed apparent 70-year-old who talked about his gym workouts. “I asked when he started, and he told me, ‘Oh, a couple years ago when I was 100. I’m getting in shape for the Senior Olympics.’ When he competed he not only won every event he entered, he set the World Record. He was alone in his age category— a two-foot shot put was the best ever. That’s typical. Everything the new old do is a first in human history.”

Ken gave an expertly graphic presentation, but much is quotable…

“Of all the human who have ever lived over 65, two-thirds are now alive now.”

“I went to a conference of cosmetic surgeons. All their wives looked identical.”

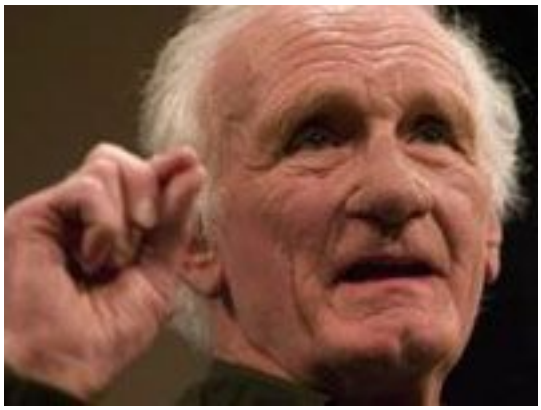
“Heart disease kills more people than all the other leading causes of death put together, including cancer. Cure heart disease and you create 20 million demented people. Our health system is not geared for chronic disease.”

“In the US the old used to be the poorest segment of society. Now they’re the richest. For instance, they buy 80% of luxury travel. So why are they still getting discounts?”

“People vote their age. 30% of 30-year-olds vote. 50% of 50-year-olds vote. 70% of 70-year-olds vote. We have a gerontocracy.”

“The old do the least volunteering of any age group, and for every 11 cents that children get from government, the old demand and get a dollar. The concept of giving back is still foreign to them. If the now-aging Baby Boomers decide to reverse that, they’ll earn the title, “The Grandest Generation.”

“What people really want, and what they’re going to get, is longer HEALTH span. We should be asking now, What is the PURPOSE of longer life?”



James Carse

Religious War In Light of the Infinite Game

January 14, 02005 http://longnow.org/seminars/02005/jan/14/religious-war-in-light-of-the-infinite-game/

Summary

Written by Stewart Brand

Finite and infinite games

Countless readers have been hooked by the opening line of James P. Carse's *Finite and Infinite Games* — "There are at least two kinds of games. One could be called finite, the other, infinite. A finite game is played for the purpose of winning, an infinite game for the purpose of continuing the play." Readers become rereaders; the tiny book rewards close study. I used Carse's ideas for the concluding chapter of my own book on long-term thinking.

Meanwhile we seem to be flirting these days with the prospect of a global religious war.

"War is the ultimate finite game. Religion is the ultimate infinite game," said Jim Carse last night. "Evil does exist: it is when an infinite game is absorbed utterly in a finite game. All evil is an attempt to eliminate evil."

Carse's talk, "Religion War in Light of the Infinite Game," drew on the work he's doing toward a new book, to be titled *Higher Ignorance: The Religious Case Against Belief*.

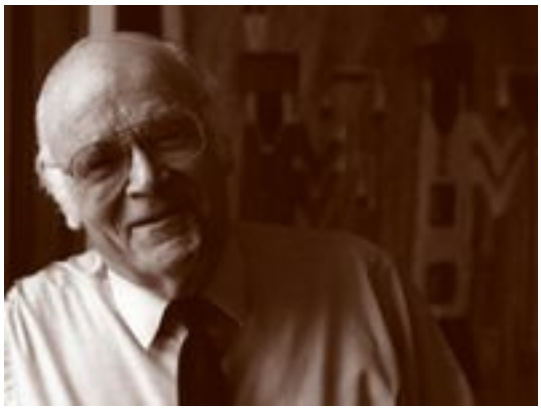
Belief, he said, assumes that nothing can happen later to change your belief. It is the opposite of the long now. It is a right-now that never changes. Such end-of-history thinking can be extremely vicious. Communism, for example, had a merciless logic behind its purges. Believers require non-believers and are always thinking about them.

But living religions, he said, can never be fully defined. They are like a reverse black hole that endlessly generates provocation. They are profoundly "horizonal"—wonder driven— as opposed to bounded.

Finite games require boundaries in space, time, and psychology. Infinite players prefer to live within horizons—boundaries that expand as you approach them.

And rather than seeking to defeat the opponent, “an infinite player has the talent to see when someone is about to lose and is eager to change the rules to get them back in the game.”

The copies of Carse’s book *Finite and Infinite Games* we had on hand sold out (that’s never happened before with a speaker). You can get your own copy at this LINK.



Roger Kennedy

The Political History of North America from 25,000 BC to 12,000 AD

February 25, 02005 http://longnow.org/seminars/02005/feb/25/the-political-history-of-north-america-from-25000bc-to-12000ad/

Summary

Written by Stewart Brand

Ancient American politics

Roger Kennedy, the former head of the Smithsonian National Museum of American History and former Director of the US National Park Service, is so eloquent that Walt Kelly based a “Pogo” character on him (the bear P.T. Bridgeport, whose speech balloons are circus posters).

Roger Kennedy’s most driving current interest is the long-term effects of long-term abuse of natural systems, and he means seriously long term.

Kennedy knows politics. For decades a major player himself in Washington DC, he has written redefining biographies of Thomas Jefferson, Alexander Hamilton, and Aaron Burr. Kennedy knows history. Besides writing and hosting a number of television series on American history, he wrote *Rediscovering America* and *Hidden Cities: The Discovery and Loss of Ancient North American Civilization*. And Kennedy knows natural systems. As a highly popular Director of the National Park Service, he pushed the whole Park System toward greater emphasis on science.

Roger Kennedy also found the mountain in Nevada where The Long Now Foundation aims to build the 10,000-year Clock. In this talk he defines the continental frame of the Clock.

Most of Roger Kennedy’s audience Friday night had no idea that a multi-millennia sequence of major cultures, cities, and earth monuments of enormous size once occupied the Mississippi valley and areas in Ohio and the Southeast. They had never heard of the vast ruins at places such as Poverty Point and Cahokia. But American founding fathers Washington and Jefferson knew of the ancient works and honored them

with new-made earth mounds at Mt. Vernon and Monticello.

The continent was seething with activity before whites arrived. The native woodland farmers of the Great Lakes who were driven west into the plains by the Chippewayan tribes were transforming into fierce horseback warriors known as the Sioux. The Iroquois League was building into a major military empire. Apaches and Navahos were streaming down from the northwest and challenging the dry farming Pueblo tribes. From time to time whole areas, such as Ohio, had their carrying capacity exceeded and emptied out of people and were afterward known as “cursed” regions.

Misuse of natural systems was common of old on the continent. It has accelerated lately. Roger focussed in particular on the new levels of hazard to people from wildfire, caused by “sprawling into danger”— the growth of human habitation (often government subsidized) into known highly flammable environments. The situation is akin to what was finally figured out about flood plains. Roger expects some disasters with thousands killed unless the mechanisms of prudence are figured out. Every small increment of climate warming will greatly increase the danger. At the intense dinner with Sponsors later, Roger urged a tax revolt against the government paying for people’s losses to wildfire. If private insurers won’t give coverage in some flammable areas, the government should not either.

Roger jolted the San Francisco audience with frequent Christian quotes and allusions, noting the MORAL reverence of natural systems advocated by Genesis, by Saint Francis, and by the great New England pilgrim preacher Jonathan Edwards.

Roger noted that Americans occasionally get their nerve up and change the nation’s behavior at a profound level. In 1830 most American men went to bed drunk. By a decade later, the alcoholism had been cut by 60%, without draconian laws. In the 1860s moral force overcame

economic force, and slavery was abolished, at great cost eventually deemed wholly worth it.

Yet another gathering of nerve is needed, Roger opined, to deeply adjust our behavior in relation to the continent's natural systems. He sees signs that the moral strength needed is indeed building.

Spencer Beebe

Very Long-term Very Large-scale Biomimicry

March 11, 02005 http://longnow.org/seminars/02005/mar/11/very-long-term-very-large-scale-biomimicry/

Summary

Written by Stewart Brand

The rainforests of home

Spencer Beebe is founder and head of Ecotrust, the Portland-based organization that is setting in motion a permanently prosperous conservation economy for the entire Pacific Coast from San Francisco north to Alaska— the temperate rain forest also known as “Salmon Nation.”

Spencer Beebe began his Seminar About Long-term Thinking last night with some quotes. First was from Janine Benyus, with her evoking of Nature as model, as measure, and as mentor for proper human biomimicry. Then came quotes from Jane Jacobs insisting that humans are so embedded in nature we can’t imitate it, but only use its methods. (Spencer observed, “Nature not only bats last, it owns the stadium.”) Finally, Dave Foreman of Earth First! once was asked what’s the best thing an individual can do for the environment, and his advice was “Stay home.” (That was challenged later.)

Our home, said Spencer, is a coastal temperate rain forest, the largest in the world (they’re rare.) It is 2,000 miles long north to south, spanning far more latitudes than any other uniform environment. (That may help make it robust against climate change.) It has more standing biomass than any other natural system, three to four times that of tropical rain forests.

Temperate rain forests are shaped by rain through 80% of the year, with no summer drought, hence few fires, hence huge and old trees. A red cedar can live 1,500 years. Since the forest is relatively recent, just 5,000 years old, that’s just five generations of cedars.

It is all salmon country. Ecotrust has named the region “Salmon Nation.” Spencer noted that European impact on the region has been to drastically reduce the forests, the salmon, and the native tribes, with a gradient of damage from south to north, from here to Alaska.

The greatest damage comes from clear-cutting the forest. With vivid pictures and economic analysis he showed the much greater long-term yield that can be accomplished with biomimetic forest practices, expanding on the storm-damage patchiness that occurs naturally. Thus selective logging with patch cuts and thinning brings out plenty of marketable timber but leaves a fully intact and healthy forest producing an ever-growing harvest of jobs, clear water, carbon capture, and rich biodiversity.

Ecotrust has an astonishing array of projects— working with the Haisla tribe in Canada to permanently protect the only remaining unlogged watershed on the Pacific coast; working with the variety of groups in Clayaquot Sound in BC to convert the area to an “eco-economy;” spending $12-million on rebuilding a historic warehouse in Portland, Oregon, to generate an urban center for eco-activities; running vast geographic inventories of the whole region; publishing an array of inspirational and technical works (our book table sold out all the Ecotrust publications)…

“Societies do what societies think,” said Spencer. He quoted Jane Jacobs and Kevin Kelly to the effect that “Systems make themselves up as they go along. That means you don’t have to figure out everything in advance, you can just jump in.”

In the Q & A, Paul Hawken asked how Ecotrust was able to so quickly win the trust and active collaboration of tribal groups like the Haisla. Spencer said, “You just listen. I went fishing with them. They’ve been here for ten or twelve thousand years. You respect that knowledge and work with it.”

Later at dinner Kevin Kelly disputed Spencer's assumption that humans are wholly immersed in Nature— "I think we're just partly immersed, and that's what makes us human and effective." I linked Kevin's question to mine wondering about the "Stay home" admonition. Spencer brought passionate perspective and array of skills to saving the "rainforests of home" by having LEFT his five-generation home in Oregon, to work first as a Peace Corps volunteer in Central America, then as a professional environmentalist saving tropical rain forests for decades. He didn't just think globally, he acted globally, THEN returned and acted locally to great and satisfying effect.

Stewart Brand

Cities & Time

April 8, 02005 http://longnow.org/seminars/02005/apr/08/cities-and-time/

Summary

Written by Stewart Brand

A world made of cities

Cities are the human organizations with the greatest longevity but also the fastest rate of change. Just now the world is going massively and unstoppably urban (governments everywhere are trying to stop it, with zero success). In a globalized world, city states are re-emerging as a dominant economic player. Environmental consequences and opportunities abound.

As the author of *How Buildings Learn* I kept getting asked to give talks on "How Cities Learn." With a little research I found that cities do indeed "learn" (adapt) impressively, but what cities mainly do is teach. They teach civilization.

I started with a spectacular video of a stadium in Philadelphia being blown up last year. The announcer on the video ends it, "Ladies and gentlemen, you have just witnessed history!" Indeed demolition is the history of cities.

Cities are humanity's longest-lived organizations (Jericho dates back 10,500 years), but also the most constantly changing. Even in Europe they consume 2-3% of their material fabric a year, which means a wholly new city every 50 years. In the US and the developing world it's much faster.

Every week in the world a million new people move to cities. In 2007 50% of our 6.5 billion population will live in cities. In 1800 it was 3% of the total population then. In 1900 it was 14%. In 2030 it's expected to be 61%. This is a tipping point. We're becoming a city planet.

One of the effects of globalization is to empower cities more and more.

Communications and economic activities bypass national boundaries. With many national governments in the developing world discredited, corporations and NGOs go direct to where the markets, the workers, and the needs are, in the cities. Every city is becoming a "world city." Many elites don't live in one city now, they live "in cities."

Massive urbanization is stopping the population explosion cold. When people move to town, their birthrate drops immediately to the replacement level of 2.1 children/women, and keeps right on dropping. Whereas children are an asset in the countryside, they're a liability in the city. The remaining 2 billion people expected before world population peaks and begins dropping will all be urban dwellers (rural population is sinking everywhere). And urban dwellers have fewer children. Also more and more of the remaining population will be older people, who also don't have children.

I conjured some with a diagram showing a pace-layered cross section of civilization, whose components operate at importantly different rates. Fashion changes quickly, Commerce less quickly, Infrastructure slower than that, then Governance, then Culture, and slowest is Nature. The fast parts learn, propose, and absorb shocks; the slow parts remember, integrate, and constrain. The fast parts get all the attention. The slow parts have all the power.

I found the same diagram applies to cities. Indeed, as historians have pointed out, "Civilization is what happens in cities." The robustness of pace layering is how cities learn. Because cities particularly emphasize the faster elements, that is how they "teach" society at large.

Speed of urban development is not necessarily bad. Many people deplored the huge Levittown tracts when they were created in the '40s and '50s, but they turned out to be tremendously adaptive and quickly adopted a local identity, with every house becoming different. The form of housing that resists local identity is gated communities, with their

fierce regulations prohibiting anything interesting being done by home owners that might affect real estate value for the neighbors (no laundry drying outside!). If you want a new community to express local life and have deep adaptivity, emphasize the houses becoming homes rather than speculative real estate.

Vast new urban communities is the main event in the world for the present and coming decades. The villages and countrysides of the entire world are emptying out. Why? I was told by Kavita Ramdas, head of the Global Fund for Women, “In the village, all there is for a woman is to obey her husband and family elder, pound grain, and sing. If she moves to town, she can get a job, start a business, and get education for her children. Her independence goes up, and her religious fundamentalism goes down.”

So much for the romanticism of villages. In reality, life in the country is dull, backbreaking, impoverished, restricted, exposed, and dangerous. Life in the city is exciting, less grueling, better paid, free, private, and safe.

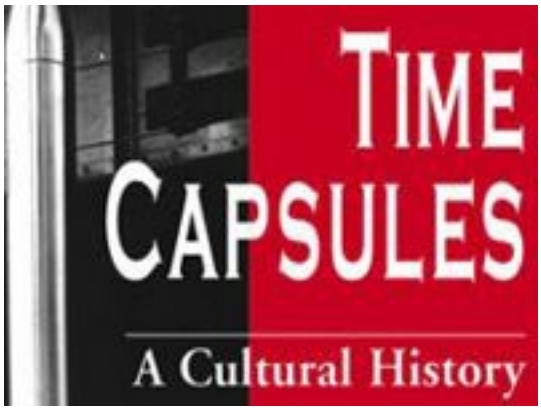
One-sixth of humanity, a billion people, now live in squatter cities (”slums”) and millions more are on the way. Governments try everything to head them off, with total failure. Squatter cities are vibrant places. They’re self-organized and self-constructed. Newcomers find whole support communities of family, neighbors, and highly active religious groups (Pentacostal Christians and Islamicists). The informal economy of the squatter cities is often larger than the formal economy. Slum-laden Mumbai (Bombay) provides one-sixth of India’s entire Gross Domestic Product. The “agglomeration economies” of the burgeoning mega-cities leads to the highest wages, and that’s what draws ever more people.

So besides solving the population problem, the growing cities are curing poverty. What looks like huge cesspools of poverty in the slums are actually populations of people getting out of poverty as fast as they can.

And cities also have an environmental dimension, which has not yet been well explored or developed.

There has been some useful analysis of the “ecological footprint” that cities make on the landscape, incorporating the impacts of fuel use, waste, etc. but that analysis has not compared the per-person impact of city dwellers versus that of people in the countryside, who drive longer distances, use large quantities of material, etc. The effect of 1,000 people leaving a county of 1,000 people is much greater than that of the same 1,000 people showing up in a city of one million. Density of occupation in cities has many environmental advantages yet to be examined.

At present there’s little awareness among environmentalists that growing cities are where the action and opportunities are, and there’s little scientific data being collected. I think a large-scale, long-term environmental strategy for urbanization is needed, two-pronged. One, take advantage of the emptying countryside (where the trees and other natural systems are growing back fast) and preserve, protect, and restore those landscape in a way that will retain their health when people eventually move back. Two, bear down on helping the growing cities to become more humane to live in and better related to the natural systems around them. Don’t fight the squatters. Join them.



Will Jarvis

Time Capsule Behavior

May 13, 02005 http://longnow.org/seminars/02005/may/13/time-capsule-behavior/

Summary

Written by Stewart Brand

Time capsule secrets

High school classes and world's fairs do it. Universities and builders and companies and municipalities do it. They bury little hoards of things they think people in the future will treasure— the future being ten years or ten thousand or never (most time capsules are immediately forgotten). Something strange, deep, and rather endearing is going on.

Time capsules are about talking to the present, not the future.

That's the main thing I learned from William Jarvis's hilarious expose of time capsule reality last night.

Jarvis told a story not in his book *Time Capsules: A Cultural History*. The Epic of Gilgamesh, humanity's earliest literary work, begins with instruction how to find a box of copper inside a foundation stone in the great walls of Uruk, and in the box is Gilgamesh's tale, written on a lapis tablet. "The first time capsule was a plot device," said Jarvis.

In 1937 plans for the New York World's Fair included a scheme to bury a "time bomb" of artifacts and information to be opened 5,000 years in the future. Someone suggested that a more discreet name for it might be "time capsule," and the term has become generic since. When that time capsule was formally lowered into the earth in 1938, an announcer intoned, "Now it begins its long journey through time," and people spontaneously took off their hats and bowed their heads while "Taps" was played.

That's what time capsules are for, Jarvis suggested. They are to impress and inspire contemporaries. They are an enjoyable technical and

philosophical challenge, a way to think about the "notional futurescape" in which they will be opened. Jarvis outlined the history of time capsules since their origin 5,000 years ago as vaults of artifacts hidden inside the walls of Mesopotamian cities, noting that they come in four categories—intentional and unintentional (such as Pompeii), and those scheduled for retrieval on a certain date (often 10, 100, or 1,000 years later), and those not.

One question from the audience was, "What is the effect of time capsules while they are still unopened?" "They seem to engender forgetfulness," replied Jarvis. Most are lost track of almost immediately. Signs pointing to them are always stolen. "Some time capsules are never even sealed."

Danny Hillis asked, "What is the experience of opening a time capsule like?" Jarvis said the norm was well expressed by the headline of a satirical news story in "The Onion": NEWLY UNEARTHED TIME CAPSULE JUST FULL OF USELESS OLD CRAP. The universal experience is disappointment. People always turn out to have saved the wrong things. For example, they save pristine things, when it's used items that show the most real information. Unintentional time capsules like Pompeii demonstrate what people are really interested in but which never make it into intentional time capsules— items such as the graffiti on a Pompeii wall, "All the sleepyheads are voting for Petronius."

Question from the audience: "Have any great mysteries been solved by a time capsule?" Answer: "No. We've never learned anything from opening a time capsule."

Kevin Kelly asked the last question, "Would you recommend that people stop making time capsules?" The world's expert on time capsules answered with a smile, "It would be like recommending that people stop playing golf."

Robert Neuwirth

The 21st Century Medieval City

June 10, 02005 http://longnow.org/seminars/02005/jun/10/the-21st-century-medieval-city/

Summary

Written by Stewart Brand

World squatter reality

Humanity is urbanizing at a world-changing pace and in a world-changing way. A billion squatters are re-inventing their lives and their cities simultaneously. One of the few to experience the range of the phenomenon first hand is Robert Neuwirth, author of *Shadow Cities: A Billion Squatters, A New Urban World*. He took up residence in the scariest-seeming parts of squatter cities in Rio, Nairobi, Istanbul, and Mumbai. They vary profoundly. What Neuwirth found in the new "slums" is the future via the past. Hence his title:

"The 21st-century Medieval City," Robert Neuwirth,

For his talk "The 21st-century Medieval City," Robert Neuwirth took an overflow audience to "the cities of tomorrow," the developing-world shanty-towns where a billion people live now, and three billion (a third of humanity) are expected to be living by 2050. With vivid stories and slides (shown for the first time publicly), Neuwirth detailed how life works for the squatters in Rio, Nairobi, Istanbul, and Mumbai. It's hard for new arrivals— 1.4 million a week around the world, 70 million a year. They throw together mud huts and make do with no water, no electricity, no transportation, no sewage, and barely room to turn around amid square miles of dense crowding.

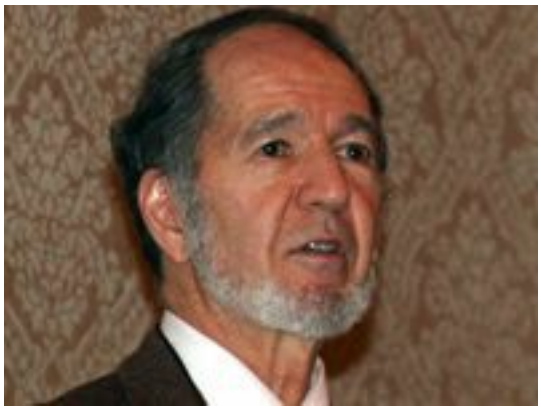
What brings them from the countryside is the hope of economic activity, and it abounds. Restaurants, beauty shops, bars, health clinics, food markets. No land is owned, but a whole low-cost real estate economy takes shape, managed without lawyers or government approval. (Hernando de Soto is wrong about land ownership being necessary for growth.) People build their house, a wall at a time when they have a bit of

money, and then sell their roof space for another family to build a home there, and so on up, story after story. Devoid of legal land title there are prospering department stores and car dealerships in the older squatter towns of Istanbul. Forty percent of Istanbul, a city of 12 million, is squatter built.

Rio is a famously dangerous city, for tourists and natives alike, except in the squatter neighborhoods where no police go. There security is provided by drug gangs, who have become surprisingly communitarian, building day care facilities and soccer fields along with providing safety on the "streets"— narrow stairways kinking up the steep mountainside amid overhanging upper stories looking indeed medieval. There are wires and pipes everywhere carrying stolen electricity and water. (Enlightened power companies realized the thieves are potential customers and are making it easy for them to buy into legitimate service.)

Neuwirth pointed out that squatters "do more with less than anybody." All that the rest of us have to do is meet them halfway for their new cities to thrive. There are two crucial ingredients for success. One is what the UN calls "security of tenure"— confidence that you will not be arbitrarily evicted. The second is access to politics— some avenue to growing legitimacy and participation in the larger city.

This is the historic process, after all. All the great cities, including San Francisco, began as dense warrens of illegal huts. "It is a legitimate form of urban development."



Jared Diamond

How Societies Fail-And Sometimes Succeed

July 15, 02005 http://longnow.org/seminars/02005/jul/15/how-societies-fail-and-sometimes-succeed/

Summary

Written by Stewart Brand

On failing to think long-term

Sophisticated societies from time to time collapse utterly, often leaving traces of a civilization that was at a proud peak just before the fall. Other societies facing the same dangers figure out how to adapt around them, recover, and go on to further centuries of success. Tonight the author of *Collapse* examines the differences between them…

To an overflow house (our apologies to those who couldn't make it in!), Jared Diamond articulately spelled out how his best-selling book, *Collapse*, took shape.

At first it was going to be a book of 18 chapters chronicling 18 collapses of once-powerful societies— the Mayans with the most advanced culture in the Americas, the Anasazi who built six-story skyscrapers at Chaco, the Norse who occupied Greenland for 500 years. But he wanted to contrast those with success stories like Tokugawa-era Japan, which wholly reversed its lethal deforestation, and Iceland, which learned to finesse a highly fragile and subtle environment.

Diamond also wanted to study modern situations with clear connections to the ancient collapses. Rwanda losing millions in warfare caused by ecological overpressure. China— "because of its size, China's problems are the world's problems." Australia, with its ambitions to overcome a horrible environmental history. And Diamond's beloved Montana, so seemingly pristine, so self-endangered on multiple fronts.

He elaborated a bit on his book's account of the Easter Island collapse, where a society that could build 80-ton statues 33 feet high and drag them 12 miles, and who could navigate the Pacific Ocean to and from the most

remote islands in the world, could also cut down their rich rain forest and doom themselves utterly. With no trees left for fishing canoes, the Easter Islanders turned to devouring each other. The appropriate insult to madden a member of a rival clan was, “The flesh of your mother sticks between my teeth!” The population fell by 90% in a few years, and neither the society nor the island ecology have recovered in the 300 years since.

Diamond reported that his students at UCLA tried to imagine how the guy who cut down the LAST tree in 1680 justified his actions. What did he say? Their candidate quotes: “Fear not. Our advancing technology will solve this problem.” “This is MY tree, MY property! I can do what I want with it.” “Your environmentalist concerns are exaggerated. We need more research.” “Just have faith. God will provide.”

The question everyone asks, Diamond said, is, How can people be so dumb? It’s a crucial question, with a complex answer. He said that sometimes it’s a failure to perceive a problem, especially if it comes on very slowly, like climate change. Often it’s a matter of conflicting interests with no resolution at a higher level than the interests— warring clans, greedy industries. Or there may be a failure to examine and understand the past.

Overall, it’s a failure to think long term. That itself has many causes. One common one is that elites become insulated from the consequences of their actions. Thus the Mayan kings could ignore the soil erosion that was destroying their crops. Thus the American wealthy these days can enjoy private security, private education, and private retirement money. Thus America itself can act like a gated community in relation to the rest of the world, imagining that events in remote Somalia or Afghanistan have nothing to do with us. Isolation, Diamond declared, is never a solution to long-term problems.

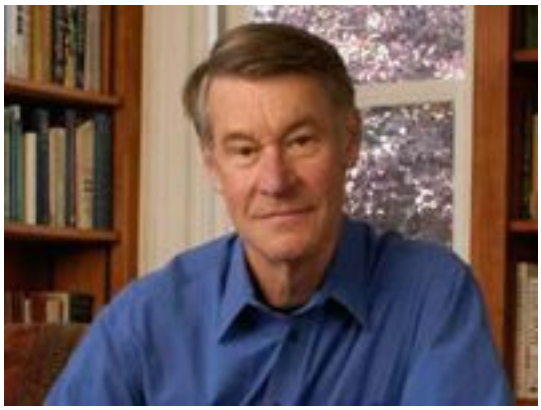
I’ll add two items to what Diamond said in his talk. One good sharp

question came from Mark Hertzgaard, who asked the speaker if he agreed "with Stewart Brand's view that the threat of climate change justifies adopting more nuclear power." To my surprise, Diamond said that he was persuaded by last year's "Bipartisan Strategy to Meet America's Energy Challenges" to treat nuclear as one important way to reduce the production of greenhouse gases. (In the commission's report, the environmentalist co-chair John Holdren wrote: ""Given the risks from climate change and the challenges that face all of the low-carbon and no-carbon supply options, it would be imprudent in the extreme not to try to keep the nuclear option open.")

While I was driving Jared Diamond back to the El Drisco hotel, we got talking about how to separate the good actors from the bad actors among corporations. He said that third-party validation was absolutely essential. For instance, he studied the exemplary environmental behavior of Chevron in Papua New Guinea and reported on it in "Discover" magazine. As a result of that favorable report, validated by the World Wildlife Fund (where Diamond is a director), Chevron was able to land an immensely valuable contract with Norway, who was demanding environmentally responsible behavior from any oil company it would deal with.

The new term taken seriously in oil and mining corporations, Diamond said, is "social license to operate." A company must earn that from the public in order to stay in business.

And we the public must do our vigilant part so that "social license" means something.



Robert Fuller

Patient Revolution: Human Rights Past and Future

August 12, 02005 http://longnow.org/seminars/02005/aug/12/patient-revolution-human-rights-past-and-future/

Summary

Written by Stewart Brand

The culminating human right

What does it take to change human habits of cruelty (such as slavery, genocide) and humiliation (racism, sexism)?

What do past and present efforts for human rights tell about their future?
…

Robert Fuller is author of the ground-breaking *Somebodies and Nobodies: Overcoming the Abuse of Rank*.

"Personal is political," Robert Fuller began, and he recounted his experience as president of Oberlin College in the early 1970s. It was the time when a number of movements were coming to a focus to empower women, blacks (and native Americans and Latinos), gays, and the disabled. As it happened, Oberlin had dealt with anti-Semitism a half-century earlier, so that was not in the mix but served as an example of how to make things better.

Fuller wondered if all the movements have something in common and eventually concluded that they do. Each is a specific instance of a generic wrong— the abuse of rank.

Rank itself is fine, indeed necessary to any functioning hierarchy. The abuse is taking advantage of rank to deal out humiliation. "Rankism ranges all the way from hurt feelings to genocide," said Fuller. Misusing rank defeats what value there is in rank. Organizations and societies that indulge in it are only partially functional.

What can be done about it? "The Golden Rule needs teeth." Fuller observed that in the past it always took someone in the oppressor class to

get action moving. Once a movement is under way, it has to just keep bearing down over time. You stand down the bullies one by one. Criminal executives, he noted, are now going to jail, even though most people predicted none would. In time politicians who indulge in ad hominem insults of their opponents should be voted out. Rankists in business should find their careers blighted. Television shows that bank on humiliation (”reality” TV, political wrath programs) should lose their advertisers.

Humiliation worked as a tool in previous movements— women ridiculing sexist men— but it can’t work in this one. “If you sneer at someone for driving an obnoxious Hummer, he’ll just go out and buy a bigger Hummer.” To be treated with dignity you have to treat others with dignity. That was Martin Luther King’s genius, and why he won.

Fuller observed that enormous changes in what is assumed to be human nature can be accomplished in just a few generations. His great-grandparents would have participated in a lynching; his children date interracially. Democracy, one of the tools for defeating rankism, has been growing exponentially since the Magna Carta in 1215.

Rankist behavior could be in full retreat in this century. It will take wide and steady effort. But there no guarantee. If society breaks down from a catastrophic pandemic, climate change, or nuclear war, everything goes backward.

Ray Kurzweil

Kurzweil's Law

September 23, 02005
http://longnow.org/seminars/02005/sep/23/kurzweils-law/

Summary

Written by Stewart Brand

Escape velocity

Attempts to think long term, Ray Kurzweil began, keep making the mistake of imagining that the pace of the future is like the pace of the past. Pondering the next ten years, we usually begin by studying the last ten years. He recommends studying the last twenty year for clues about the rate and degree of change coming in the next ten years, because history self-accelerates. That's Kurzweil's Law of accelerating returns: "technology and evolutionary processes progress in an exponential fashion."

Thus, since the rate of progress doubles every ten years or so, we will see changes in the next 90 years equivalent to the last 10,000 years, and in the next 100 years changes equivalent to the last 20,000 years. It is always the later doublings where the ferocious action is. The many skeptics about the Human Genome project being done in 15 years thought they were being proved right at year 10. They were astounded when the project came in on schedule. "People look at short sections of an exponential growth curve and imagine they are straight lines," said Kurzweil.

Noticing that his audience was astute as well as large (650 in the Herbst), the speaker gave a dense, fast-moving talk. He said that as an inventor and entrepreneur he found that "you have to invent for when you finish a project, not when you start— you need to figure out what enabling factors will be in place when your product comes to market." That was what started him studying trends in technology. In rapid succession he showed on the screen graphs of technological advance in microprocessors per chip (Moore's Law), microprocessor clock speed, cheapness of transistors, cheapness of dynamic random access memory, amount and cheapness of digital storage, bandwidth, processor performance in MIPS,

total bits shipped, supercomputer power, Internet hosts and data traffic, and then on into biotech with cheapness of genome sequencing per base pair, growth in Genbank, and further on into nanotech with smallness of working mechanical devices, and nanotech science citations and patents.

They ALL show exponential growth rates, with no slowing in overall progress, since new paradigms always arise to keep up the pace, as transistors replaced vacuum tubes in computers, and 3D molecular computing and nanotubes will replace transistors. “Everything to do with information technology is doubling every 12 to 15 months, and information technology is encompassing everything.”

I was impressed that the growth curves ignore apparent shocks. The 1990s dot-com boom and subsequent bust seemed like a big event, but it doesn’t even show up as a blip on Kurzweil’s exponential growth curve of e-commerce revenues in the US. At dinner with Long Now sponsors after the talk, he proposed that the stringent American regulations on stem cell research will not slow the pace of breakthroughs in that field, because there are so many political (overseas, for example) and technological workarounds. The fate of individual projects is always unknowable, but the aggregate behavior over time of massive and complex arrays of activity is knowable in surprising detail.

Kurzweil expects this century to provide dramatic events early and often. “With the coming of gene therapy, before we see designer babies we’ll see designer baby-boomers.” By 2010 he expects computers to disappear into our clothing, bodies, and built environment. The World Wide Web will be a World Wide Mesh, where all the linked devices are also servers, so massive supercomputing can be ubiquitous. Images will be project right onto retinas, helping lead toward true immersion virtual reality. Search engines won’t wait to be asked to offer information. By 2030 he presumes that nanobots will occupy and enhance our nervous systems. The brain will have been reverse engineered so that we will understand the real structure of intelligence. A thousand dollars of machine

computation will exceed human brain capacity by a thousand times. Shortly after that intelligence begins to break completely free of its biological constrictions and carries humanity into suffusing energy and matter toward potentially cosmic scale (IF the restricting barrier of the speed of light can be worked around). Kurzweil noted that among "singularitarians" he is known as somewhat conservative, expecting a "soft takeoff" instead of hard takeoff.

In the Q & A he dealt with the usual "but what about limitations of resources?" questions with predictions that nanotech would increase efficiencies and make materials so fungible that what are seen now as severe limitations will fall away. Only one question made him pause, and a very long pause it was, sort of a stunned silence. I asked him (through Kevin Kelly), "As everything goes faster and faster, is there anything that will or should remain slow?" Finally Kurzweil said, "Well. You know, even meditation will go quicker." Another pause. "But it might SEEM slow," he said politely.

George Dyson, Freeman Dyson, Esther Dyson

The Difficulty of Looking Far Ahead

October 5, 02005 http://longnow.org/seminars/02005/oct/05/the-difficulty-of-looking-far-ahead/

Summary

Written by Kevin Kelly

Finessing the future

Instead of one podium there were four chairs on the stage of Wednesday's seminar. In three seats, three Dysons: Esther, George and Freeman. They were appearing together on stage for the first time. The fourth held Stewart Brand who led the three through an evening of queries. The questions came from Stewart himself, from the audience, and from one Dyson to another Dyson — a first for this format in a Long Now seminar.

George introduced his dad with an exquisite slideshow of Freeman's prime documents. He began with a scan of a first grade school paper Freeman wrote on "Astronimy." Besides the forgivable misspellings, the essay was full of fantasy. Freeman did not just copy material from an encyclopedia. He imagined what should be and wrote it as fact. George then showed a later blue-book essay of Freeman's fiction, but it was studded with numbers and calculations. Right there was the pattern for Freeman's many other publications (first pages shown by George): speculations built upon calculations. We saw one paper inscribed by Freeman with the note: "From one crackpot to another!" His most famous speculation is for a solar system-sized enclosure around a sun now called a Dyson Sphere. George's presentation on Freeman ended with a video clip of a Star Trek episode where the befuddle Captain Piccard ponders a mysterious hollow solar-sized ball blocking their way and gasps, "Could it be a dyson-sphere?!!"

Freeman followed this with a few minutes of musing on the difficulty of long term predictions. When Von Neumann and others were working on the first computers, none of them could imagine they would be used in toys for 3-year olds. In a theme that he would return to the rest of the

evening, Freeman compared that surprise with the coming surprises we'll see in biotech. He said, "It is unfortunate that Von Neumann used the first computers to build nuclear weapons, because computers became associated with institutional destruction. The same thing is happening now with biotech. It is unfortunate that the first biotech is being used for institutional destruction of weeds, but soon biotech will become smaller scale, user-friendly, and employed by gardeners, naturalists, and kids to make their own creations. People's feelings about biotech will also change."

"I misjudged a lot of things. Like nuclear power took much longer than I thought. We also thought we had a wonderful spaceship that was going to take us to Saturn (we were really going to go ourselves). The hardest thing to foresee is how long things take." Freeman sang the praises of science fiction as hugely important for science. "It's where the most radical ideas come from first." He wishes he read more of it, a sentiment echoed by George and Esther.

Esther chimed in with her interpretation of future study. Freeman, she said, tried to understand things now by speculating on their future, while George mined the past to try to understand the future. She, on the contrary, wasn't interested in understanding the future. She chiefly wanted to affect it. "What good is it to have a conference about future technologies unless you can in some way make things happen?"

What won't change? That was a question from the audience. George told about spying inhabited islands off the coast of the northwest 30 years ago and expecting that technology would transform them into places full of humans. But they are still deserted; cities are ever more enticing. The early native tribes he studied would have 12 good friends and 30 close acquaintances. He says that if you check people's cell phones they have on average 12 intimate friends always allowed to ring and 30 names to call out. We haven't changed much.

Freeman continued that thread saying he is a skeptic of the singularity notion. “My mother saw more change in her life than I have. She went from traveling in a pony cart to flying across the ocean in a jet. I don’t see things going faster. It is an illusion.”

I asked, “What have you changed you mind about?” Esther said she changed her mind about anonymity. She used to think it was hugely important, but now she believes everything works out better when there is transparency, including in people. “We may become more tolerant because everything is visible.”

Freeman admitted he was a skeptic on global warming. His problem was not change in the climate. “In the long view we ARE changing the climate.” He felt that climate was hugely complex, that we understand very little of it and many people are reducing this unknown complexity into one data point — the average temperature somewhere. Until we understand what kind of changes we are making in our “solutions” he says he believes the best action on global climate change right now is inaction.

Of course this is only a sample of the wide-ranging conversation, which lasted 90 minutes. (Like all past talks, this one will be posted for download streaming on the Long Now site.) The agile wit and intelligence of the three Dysons was in full gear by the end of the seminar. This exchange near the end is paraphrased from my rough notes, which I believe captures the tone of the evening:

Stewart: You are 81, Freeman, and pro biotech. What’s your take on bio-engineered longevity?

Freeman: The worst thing that could happen would be if doctors cured death. There would be no room for young people in power. It would be the end of science! For me it is a black cloud on the horizon. But I think it is unavoidable. First we’ll extend life to 100 years, then to 200 years, 300

and so on…

George: Just like copyright!

Freeman: Really. The only solution is to move far far away, to have other worlds, in space or on planets where the young can dominate.

Esther: Even better, send the old guys to Mars!

It was great to have the three Dysons on earth, young and old.

Clay Shirky

Making Digital Durable: What Time Does to Categories

November 14, 02005 http://longnow.org/seminars/02005/nov/14/making-digital-durable-what-time-does-to-categories/

Summary

Written by Stewart Brand

Categories go nova

It is fortunate that the leading thinker in “social software” is one of the best speakers in the high-tech world, a hot ticket at any conference that can get him. Clay Shirky gave one of his dazzling presentations Monday, Nov. 14, examining a new dimension in one of the most vexed problems in the digital world— how the hell do we keep anything digital usable beyond ten years?

When a whole civilization goes digital, as we are, loss of continuity becomes a crucial issue, fit subject for a Seminar About Long-term Thinking. Thus…

Clay Shirky is an adjunct professor at New York University and, among other provocations, runs a mailing list on “Networks, Economics and Culture” at http://tinyurl.com/a6mt6 . Sample Shirkyism: “The only group that can categorize everything is everybody.” That defies 3,000 years of intellectual practice (Library of Congress, etc.), and it obviously can’t work, but it blithely does work in a Googlized world, and over time it’s the only thing that can work, but time introduces other problems.

“THIS is what the Internet has been straining to become,” said Clay Shirky Monday night, both joking and meaning it. He was referring to a category (”tag”) that emerged from users on the photo-sharing site Flickr. The category is “cats in sinks.”

Growing use of the unlikely seeming tag exposed something that a lot of cats do and a lot of people feel compelled to photograph…

Shirky pointed out that “cats in sinks” has none of the limitations of

former category systems such as the Dewey Decimal System or the Library of Congress scheme or Yahoo's hierarchical category structure. There is no need for a category "cats" with subcategory "in sinks," nor a category "sinks" with subcategory "cats in". The specificity of the category precisely fits its content, its traffic, and its currency. (Unlike the Dewey Decimal system which has 10 categories under "Religion," 8 of them about Christianity and one for "Other Religions. And unlike the Library of Congress system, which retains outdated categories like "Former Soviet Union" and gives equal value to the categories "Asia" and "the Balkans.")

"The only group that can categorize everything is everybody," said Shirky. And that's what web services like Google, Flickr, and Del.icio.us makes possible. Flickr links up users, photos, and tags. Del.icio.us links up users, websites, and tags. All you need for a comprehensive category system to emerge is links and tags! There is all manner of overlap, but that's not a problem (thanks to global search). Instead it's a virtue. A high degree of overlap (or redundancy, or "degeneracy" as Shirky called it) makes the system far more robust against disruption and against the erosion of time.

An example of the virtue of overlap is the Rosetta Stone. Having the same text in three written languages was the breakthrough for decoding Egyptian Hieroglyphics, whereas the meaning of Inca knotted-string language and Easter Island's Rongorongo remain lost because there is no overlapping text.

The title of Shirky's talk was "Making Digital Durable: What Time Does to Categories." While he had good news, and deep news, on the category front, he was less encouraging about digital preservation in general. "We don't know yet how bad the problem is," he said. He pointed out that there are an alarming number of levels between preserving bits (which is easy) and preserving essence (which is at best expensive and at worst impossible). To make the Bits express the Essence over time, you have to

preserve (or accurately translate forward) the Medium; and the Format; and the Interpreter; and various Dependencies; and the Operating System; and the Architecture; and the Power system (is 110 A.C. power forever?) Any of that missing or corrupted or misblended, and all is lost.

In 1995 Shirky published a book called *Voices From the Net*. Though written and printed with digital files, neither the author nor the publisher Ziff-Davis have a working digital version of the book's text, but Shirky's posts in sundry Usenet flame wars from that same period are preserved intact to embarrass him apparently indefinitely. Why did one form of his writing survive and the other not? The book was written and printed with an expensive, brittle system with few users, whereas Usenet is a cheap, flexible system with a vast number of users. Cheap and big always wins.

But for how long? "Preservation is an outcome," said Shirky. You don't know if it is working until afterward. All you can do is reduce the risk of loss. Making digital durable, he said, is a "wicked" problem, meaning it can't actually be solved. It will be an endless process of negotiation.

Sam Harris

The View from the End of the World

December 9, 02005 http://longnow.org/seminars/02005/dec/09/the-view-from-the-end-of-the-world/

Summary

Written by Stewart Brand

On necessary heresy

With gentle demeanor and tight argument, Sam Harris carried an overflow audience into the core of one of the crucial issues of our time: What makes some religions lethal? How do they employ aggressive irrationality to justify threatening and controlling non-believers as well as believers? What should be our response?

Harris began with Christianity. In the US, Christians use irrational arguments about a soul in the 150 cells of a 3-day old human embryo to block stem cell research that might alleviate the suffering of millions. In Africa, Catholic doctrine uses tortured logic to actively discourage the use of condoms in countries ravaged by AIDS.

“This is genocidal stupidity,” Harris said. Faith trumps rational argument. Common-sense ethical intuition is blinded by religious metaphysics.

In the US, 22% of the population are CERTAIN that Jesus is coming back in the next 50 years, and another 22% think that it’s likely.

The good news of Christ’s return, though, can only occur following desperately bad news. Mushroom clouds would be welcomed. “End time thinking,” Harris said, “is fundamentally hostile to creating a sustainable future.”

Harris was particularly critical of religious moderates who give cover to the fundamentalists by not challenging them. The moderates say that all is justified because religion gives people meaning in their life. “But what would they say to a guy who believes there’s a diamond the size of a refrigerator buried in his backyard? The guy digs out there every Sunday

with his family, cherishing the meaning
the quest gives them."

"I've read the books," Harris said. "God is not a moderate." The Bible gives strict instructions to kill various kinds of sinners, and their relatives, and on occasion their entire towns. Yet slavery is challenged nowhere in the New or Old Testaments; slave holders in the old south used the Bible to defend their practice. The religious texts have power because they are old, but they are also hopelessly out of date because they are old.

It's taboo among religious moderates to compare religions, said Harris, but we must. "Where are the Tibetan Buddhist suicide bombers? For that matter, where are the Palestinian Christian suicide bombers— they're as Arab and aggrieved as anyone." The fundamental beliefs of Islam really are a problem. "Martyrdom in jihad is not a fringe doctrine; it is believed by millions of Muslims." It's not a question of ignorance— two-thirds of al Qaeda operatives are
college educated.

"We have no reason to expect to survive our religious differences indefinitely. Faith is intrinsically divisive. We have a choice between conversation and war." It was conversation that ended slavery, not faith. "Faith is a declaration of immunity to conversation. To make religious war unthinkable, we have to undermine the dogma of faith. The continuance of civilization requires not moderation, but reason."

Harris ended by lauding meditation and mysticism as a form of experiential science, and observed, "The wisdom of contemplative life is not evenly distributed. The East has more than the West."

Ralph Cavanagh, Peter Schwartz

Nuclear Power, Climate Change and the Next 10,000 Years

January 13, 02006 http://longnow.org/seminars/02006/jan/13/nuclear-power-climate-change-and-the-next-10000-years/

Summary

Written by Stewart Brand

Climate change and nuclear prospects

Given the power to decide who would go first— anti-nuke Ralph Cavanagh from Natural Resources Defense Counsel or pro-nuke Peter Schwartz from Global Business Network— the large audience Friday night voted for Schwartz to make the opening argument.

It is the threat of "abrupt climate change" that converted him to support new emphasis on nuclear power, Schwartz said. Gradual global warming is clearly now under way, and there is increasing reason to believe that human activity is driving it, mostly through the burning of coal and oil. If warming is all that happens, it will be an enormous problem, but some regions of the Earth would gain (Russia, Canada) while many others would lose.

In the event of abrupt climate change, though, everyone loses. The most likely change would be a sudden (in one decade) shift to a much colder, drier, and windier world. The world's carrying capacity for humans would plummet, driving human population from the current 6.5 billion to as low as 2 billion, with most of the losses from war. It would be a civilization-threatening catastrophe. From research Schwartz has led for the Pentagon as well as from his own training in fluid dynamics, he thinks that continuation of the current warming is very likely to trigger the kind of radical climate instability that has been the norm in Earth's past, except for the last 10,000 years of uncharacteristically stable climate. Therefore everything must be done to head off the shift to climate instability.

Meanwhile, Schwartz said, world demand for energy will continue to grow for decades, as two billion more people climb out of poverty and

developing nations become fully developed economies. China and India alone will double or quadruple their energy use over the next 50 years. We will run out of oil in that period. That leaves coal or nuclear for electricity. Conservation is crucial, but it doesn't generate power. Renewables must grow fast, but they cannot hope to fill the whole need. Nuclear technology has improved its efficiency and safety and can improve a lot more. Reprocessing fuel will add further efficiency.

The discussion format called for Cavanagh to quiz Schwartz for ten minutes, drawing out his views further. Cavanagh asked, "What about the storage of nuclear waste?" "We defined the problem wrong," Schwartz said. "Storage for thousands of years is not needed. The present storage on site in concrete casks is working, and the 'waste' is available as a further energy source with later technology." In the discussion Schwartz also pointed out that new reactor sites are not needed in the US, since all the existing sites are expandable.

The format called for Cavanagh to now summarize Schwartz's argument. He did so to Schwartz's satisfaction, adding a point Schwartz missed—recent findings indicating that the carbon dioxide in the atmosphere is now the highest it has been in 25,000 to 400,000 years.

It was Ralph Cavanagh's turn to present for 15 minutes, striding the front of the stage. He began by agreeing that messing with the atmosphere and thus the climate is a "suicidal" experiment for humanity to be conducting, and it has to be stopped. He agreed that nuclear should not be considered taboo and should be included as a candidate clean power source, but its history is not encouraging. No new reactors have built in the US since 1973. Nevada has stonewalled on waste storage at Yucca Mountain. The nuclear industry has all manner of government subsidies, loan guarantees, and protections from liability. It has never competed in the open market with other energy sources.

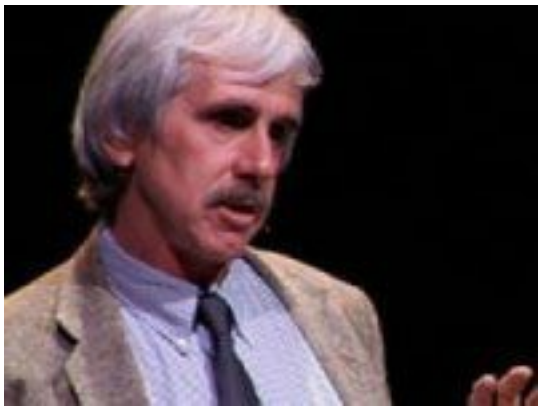
California, Cavanagh said, has led the way in developing a balanced

energy policy. Places like China are paying close attention. PG&E has become the world's largest investor in efficiency, led by Carl Weinberg (who was in the audience and got a round of applause). And now there are signs that California may become the leader in setting limits to carbon emissions. Within limits like that, then the private sector can compete with full entrepreneurial zest, and may the best technologies win. Nuclear would have to compete fairly with new forms of biofuels and with ever improving renewables.

Schwartz asked Cavanagh about the large government subsidies for solar research while there have been none for nuclear (except fusion). Cavanagh said the subsidies were declining, and should. There should be more funding for R&D in biofuels and other alternatives, but the main role for government should be in setting emission standards and then let the private sector duke it out for the best solutions.

Schwartz summarized Cavanagh's argument to his satisfaction (many later reported they liked that feature of the evening), and then a host of written questions came from the audience. Asked for a catalog of desirable new technologies, Schwartz wanted cheaper solar, effective energy storage (batteries are painfully limited), and a better electrical grid, while Cavanagh would like more R&D on vehicles and breakthroughs on coal processing.

My take on the evening is that Cavanagh was particularly persuasive on the need for nuclear to compete on the open market, and Schwartz was persuasive on the direness of climate prospects and the relative readiness of nuclear power to help.



Stephen Lansing

Perfect Order: A Thousand Years in Bali

February 13, 02006 http://longnow.org/seminars/02006/feb/13/perfect-order-a-thousand-years-in-bali/

Summary

Written by Stewart Brand

Hidden order in the Balinese "religion of water"

With lucid exposition and gorgeous graphics, anthropologist Stephen Lansing exposed the hidden structure and profound health of the traditional Balinese rice growing practices. The intensely productive terraced rice paddies of Bali are a thousand years old. So are the democratic subaks (irrigation cooperatives) that manage them, and so is the water temple system that links the subaks in a nested hierarchy.

When the Green Revolution came to Bali in 1971, suddenly everything went wrong. Along with the higher-yield rice came “technology packets” of fertilizers and pesticides and the requirement, stated in patriotic terms, to “plant as often as possible.” The result: year after year millions of tons of rice harvest were lost, mostly to voracious pests. The level of pesticide use kept being increased, to ever decreasing effect.

Meanwhile Lansing and his colleagues were teasing apart what made the old water temple system work so well. The universal problem in irrigation systems is that upstream users have all the power and no incentive to be generous to downstream users. What could account for their apparent generosity in Bali? Lansing discovered that the downstream users also had power, because pests can only controlled if everybody in the whole system plants rice at the same time (which overloads the pests with opportunity in one brief season and starves them the rest of the time). If the upstreamers didn’t let enough water through, the downstreamers could refuse to synchronize their planting, and the pests would devour the upstreamers’ rice crops.

Discussion within the subaks (which dispenses with otherwise powerful caste distinctions) and among neighboring subaks takes account of

balancing the incentives, and the exquisite public rituals of the water temple system keep everyone mindful of the whole system.

The traditional synchronized planting is far more effective against the pests than pesticides. “Plant as often as possible” was a formula for disaster.

It seems clear how such “perfect order” can maintain itself, but how did it get started? Was there some enlightened rajah who set down the rules centuries ago? Working with complexity scientists at Santa Fe Institute, Lansing built an agent-based computer model of 172 subaks planting at random times, seeking to maximize their yields and paying attention to the success of their neighbors. The system self-organized! In just ten years within the model the balanced system seen in Bali emerged on its own. No enlightened rajah was needed. (Interestingly, the very highest yields came when the model subaks paid attention not just to their immediate neighbors but to the neighbors’ neighbors as well. If they paid attention primarily to distant subaks, however, the whole system went chaotic.)

In Balinese language and understanding, “rice paddies” equals “jewel” equals “mind.”

One result of Lansing’s work is that in the 1980s the Balinese government threw out the “plant often” and pesticide parts of the Green Revolution and renewed respect for the water temple system. It kept the providentially higher yield rice. Unfortunately, it also kept pouring on the fertilizer. Balinese water is so naturally nutrient-rich, the extra fertilizer just passes through the watershed out to the sea, where it is destroying the coral reefs with algal blooms. So far, the water temple system does not reach that far downstream.

Lansing ended with a suggestion for Long Now about the perception and practice of time. In the standard western perspective, time is long but thin

— just past, present, future. In Bali, he said, time is dense. The Balinese have ten kinds of weeks operating concurrently— solar, lunar, and 7-day, 6-day, on down to a one-day week (”Today is always luang.”) It’s like the difference between the shimmering density of polycyclic gamelan music versus western romantic narrative music— beginning, middle, end.

The Long Now Foundation should figure out how to introduce Balinese time density to the time-impoverished West, Lansing said.

Kevin Kelly

The Next 100 Years of Science: Long-term Trends in the Scientific Method.

March 10, 02006 http://longnow.org/seminars/02006/mar/10/long-term-trends-in-the-scientific-method/

Summary

Written by Stewart Brand

Recursion drives science

The co-founding editor of "Wired" magazine and author of *Out of Control* is working on a new book on "what technology wants." His research led to the first-ever history of scientific methodology. Starting from this long-term view of science's past transformation, he speculates on how the practice of science will change in the future.

Science, says Kevin Kelly, is the process of changing how we know things. It is the foundation our culture and society. While civilizations come and go, science grows steadily onward. It does this by watching itself.

Recursion is the essence of science. For example, science papers cite other science papers, and that process of research pointing at itself invokes a whole higher level, the emergent shape of citation space. Recursion always does that. It is the engine of scientific progress and thus of the progress of society.

A particularly fruitful way to look at the history of science is to study how science itself has changed over time, with an eye to what that trajectory might suggest about the future. Kelly chronicled a sequence of new recursive devices in science…

- 2000 BC - First text indexes
- 200 BC - Cataloged library (at Alexandria)
- 1000 AD - Collaborative encyclopedia
- 1590 - Controlled experiment (Roger Bacon)
- 1600 - Laboratory
- 1609 - Telescopes and microscopes

- 1650 - Society of experts
- 1665 - Repeatability (Robert Boyle)
- 1665 - Scholarly journals
- 1675 - Peer review
- 1687 - Hypothesis/prediction (Isaac Newton)
- 1920 - Falsifiability (Karl Popper)
- 1926 - Randomized design (Ronald Fisher)
- 1937 - Controlled placebo
- 1946 - Computer simulation
- 1950 - Double blind experiment
- 1962 - Study of scientific method (Thomas Kuhn)

Projecting forward, Kelly had five things to say about the next 100 years in science…

1) There will be more change in the next 50 years of science than in the last 400 years.

2) This will be a century of biology. It is the domain with the most scientists, the most new results, the most economic value, the most ethical importance, and the most to learn.

3) Computers will keep leading to new ways of science. Information is growing by 66% per year while physical production grows by only 7% per year. The data volume is growing to such levels of "zillionics" that we can expect science to compile vast combinatorial libraries, to run combinatorial sweeps through possibility space (as Stephen Wolfram has done with cellular automata), and to run multiple competing hypotheses in a matrix. Deep realtime simulations and hypothesis search will drive data collection in the real world.

4) New ways of knowing will emerge. "Wikiscience" is leading to perpetually refined papers with a thousand authors. Distributed instrumentation and experiment, thanks to miniscule transaction cost,

will yield smart-mob, hive-mind science operating “fast, cheap, & out of control.” Negative results will have positive value (there is already a “Journal of Negative Results in Biomedicine”). Triple-blind experiments will emerge through massive non-invasive statistical data collection— no one, not the subjects or the experimenters, will realize an experiment was going on until later. (In the Q&A, one questioner predicted the coming of the zero-author paper, generated wholly by computers.)

5) Science will create new levels of meaning. The Internet already is made of one quintillion transistors, a trillion links, a million emails per second, 20 exabytes of memory. It is approaching the level of the human brain and is doubling every year, while the brain is not. It is all becoming effectively one machine. And we are the machine.

“Science is the way we surprise God,” said Kelly. “That’s what we’re here for.” Our moral obligation is to generate possibilities, to discover the infinite ways, however complex and high-dimension, to play the infinite game. It will take all possible species of intelligence in order for the universe to understand itself. Science, in this way, is holy. It is a divine trip.

PS… Kevin Kelly’s book in progress on all this, and much more, is being written online and is visitable and discussable at http://www.kk.org/thetechnium/index.php.

Jimmy Wales

Vision: Wikipedia and the Future of Free Culture

April 14, 02006 http://longnow.org/seminars/02006/apr/14/vision-wikipedia-and-the-future-of-free-culture/

Summary

Written by Stewart Brand

Community-built content rules

Vision is one of the most powerful forms of long-term thinking. Jimmy Wales, founder and president of the all-embracing online encyclopedia Wikipedia, examines how vision drives and defines that project and its strategy— and how it fits into the even larger world and prospects of "free culture."

"The design of Wikipedia," said its founder and president Jimmy Wales, "is the design of community."

When Wikipedia was started in 2001, all of its technology and software elements had been around since 1995. Its innovation was entirely social — free licensing of content, neutral point of view, and total openness to participants, especially new ones. The core engine of Wikipedia, as a result, is "a community of thoughtful users, a few hundred volunteers who know each other and work to guarantee the quality and integrity of the work."

Wikipedia, already enormous, continues to accelerate its growth. It is one of the top 20 websites, with 5 billion page views monthly. As an encyclopedia, it is larger than Britannica and Encarta combined and is now in so many languages, only 1/3 of the total Wikipedia is in English. When Wales went to Taiwan last week, strangers recognized him on the train, and 1,200 came to his talk. (One attraction to a Chinese audience is that Wikipedia takes the position of "no compromise with censors, ever.")

The free licensing of Wikipedia content means that it is free to copy, free to modify, free to redistribute, and free to redistribute in modified forms,

with attribution links. This is in service to the Wikipedia vision "to create and distribute a free encyclopedia of the highest possible quality to every single person on the planet in their own language." One byproduct is that Wikipedia's success is helping shift the terms of the copyright debate, in a public-good direction.

The secret of Wikipedia's content-generating process, Wales explained, is the nurturing and shaping of trust, instead building everything around distrust. He said that most social software systems are designed around expected problems. "Suppose you ran a restaurant that way. If you serve steak, that means steak knives, which are really dangerous in the wrong hands, so you need to put barriers between the tables."

"If you prevent people from doing bad things, you prevent them from doing good things, and it eliminates opportunities for trust."

Thus every page of Wikipedia has an open invitation to edit it, and the operational motto is "Be bold." The expectation is that most edits will be improvements, and they are. Problems are dealt with completely post facto. There is an all-recent-changes page watched by hundreds of people, and another page proposing "Articles for Deletion." Regular users set up watch lists for Wikipedia articles they care about, so they are notified immediately of new edits. Besides the edit history and text comparison features of the wiki itself, many users employ IRC (Internet Relay Chat) to discuss ongoing issues, from article details to general policy. The court of last resort to resolve fraught issues is a benign emperor, Jimbo Wales.

Wales continually fights the programmers to keep them from automating matters he thinks must remain social. Issues are decided not by voting but by dialogue, in which some voices have more weight because they are recognized to have earned it. Yet users do not get formal ratings. "Suppose you had to go around wearing a badge that says how many people like you." In support of the Wikipedia rule to welcome new contributors, programmers would like to install the ability to

automatically send a welcome note to anyone who has made eight contributions. Wales insists that only people can welcome people. The best way to keep Wikipedia deeply radical, Wales feels, is to keep its process deeply conservative.

Wikipedia is a window into further realms of free culture. What else can be done with wiki-enhanced communities? “A library is bigger than an encyclopedia.” So alongside the nonprofit Wikipedia Wales has set up the for-profit Wikia— a general purpose wiki community enabler, drawing its income from Google ads.

Most leaders, in my experience, focus on their organization’s product. Jimmy Wales focuses with exceptional clarity and insight on Wikipedia’s process, and therein lies its magic.

Chris Anderson, Will Hearst

The Long Time Tail

May 12, 02006 http://longnow.org/seminars/02006/may/12/the-long-time-tail/

Summary

Written by Stewart Brand

The power law is the shape of our age

You know something is up when an audience member is taking cell phone photos of the presenter's slides for instant transmittal to a business partner.

Chris Anderson does have killer slides, full of exuberant detail, defining the exact shape of the still emerging opportunity space for finding and selling formerly infindable and unsellable items of every imaginable description. The 25 million music tracks in the world. All the TV ever broadcast. Every single amateur video. All that is old, arcane, micro-niche, against-the-grain, undefinable, or remote is suddenly as accessible as the top of the pops.

"The power law is the shape of our age," Anderson asserted, showing the classic ski-jump curve of popularity— a few things sell in vast quantity, while a great many things sell in small quantity. It's the natural product of variety, inequality, and network effect sifting, which amplifies the inequality.

"Everything is measurable now," said Anderson, comparing charts of sales over time of a hit music album with a niche album. The hit declined steeply, the niche album kept its legs. The "long tail" of innumerable tiny-sellers is populated by old hits as well as new and old niche items. That's the time dimension. For the first time in history, archives have a business model. Old stuff is more profitable because the acquisition cost is lower and customer satisfaction is higher. Infinite-inventory Netflix occupies the sweet spot for movie distribution, while Blockbuster is saddled with the tyranny of the new.

Anderson explained that we are leaving an age where distribution was ruled by channel scarcity— 3 TV networks, only so many movie theater screens, limited shelf space for books. “Those scarcity effects make a bottleneck that distorts the market and distorts our culture. Infinite shelf space changes everything.” Books are freed up by print-on-demand (already a large and profitable service at Amazon), movies freed by cheap DVDs, old broadcast TV by classics collections, new videos by Google Videos and You Tube online. Even the newest game machines are now designed to be able to emulate their earlier incarnations, so you can play the original “Super Mario Bros.” if so inclined— and many are.

“I’m an editor of a Conde-Nast magazine [Wired] AND I’m a blogger,” said Anderson. In other words, he works both in the fading world of “pre-filters” and the emerging world of “post-filters.” Pre-filtering is ruled by editors, A&R guys (”artist and repertoire,” the talent-finders in the music biz), studio execs, and capital-B Buyers. Post-filtering is driven by readers, recommenders, word of mouth, and buyers.

Will Hearst joined Anderson on the stage and noted that social networking software has automated word of mouth, and that’s what has “unchoked the long tail of sheer obscure quantity in the vast backlog of old movies, for example.” Anderson agreed, “The marketing power of customer recommendations is the main driver for Netflix, and it is zero-cost marketing.”

“By democratizing the tools of distribution, we’re seeing a Renaissance in culture. We’re starting to find out just how rich our society is in terms of creativity,” Anderson said. But isn’t there a danger, he was asked from the audience, of our culture falling apart with all this super-empowered diversity? Anderson agreed that we collect strongly and narrowly around our passions now, rather than just weakly and widely around broadcast hits, but the net gain of overall creativity is the main effect, and a positive one.

Questions remain, though. “Digital rights is the elephant in the room of freeing the long tail.” Clearing copyright on old material is a profoundly wedged process at present, with no solution in sight. Will Hearst fretted that we may be becoming an “opinionocracy,” swayed by TV bloviators and online bloggers, losing the grounding of objective reporting. Anderson observed that maybe the two-party system is a pre-long-tail scarcity effect that suppresses the diversity we’re now embracing. Much of how we run our culture has yet to catch up with the long tail.

Brian Eno, Will Wright

Playing with Time

June 26, 02006 http://longnow.org/seminars/02006/jun/26/playing-with-time/

Summary

Written by Stewart Brand

Generative play

In a dazzling duet Will Wright and Brian Eno gave an intense clinic on the joys and techniques of "generative" creation.

Back in the 1970s both speakers got hooked by cellular automata such as Conway's "Game of Life," where just a few simple rules could unleash profoundly unpredictable and infinitely varied dynamic patterns. Cellular automata were the secret ingredient of Wright's genre-busting computer game "SimCity" in 1989. Eno was additionally inspired by Steve Reich's "It's Gonna Rain," in which two identical 1.8 second tape loops beat against each other out of phase for a riveting 20 minutes. That idea led to Eno's "Music for Airports" (1978), and the genre he named "ambient music" was born.

Wright observed that science is all about compressing reality to minimal rule sets, but generative creation goes the opposite direction. You look for a combination of the fewest rules that can generate a whole complex world that will always surprise you, yet within a framework that stays recognizable. "It's not engineering and design," he said, "so much as it is gardening. You plant seeds. Richard Dawkins says that a willow seed has only about 800K of data in it."

Eno noted that ambient music, unlike "narrative" music with a beginning, middle, and end, presents a steady state. "It's more like watching a river." Wright said he often uses Eno's music to work to because it gets him in a productive trancelike state. Eno remarked that it's important to keep reducing what the music attempts, and one way he does that is compose everything at double the speed it will be released. Slowing it down reduces its busyness. Wright: "How about an album of the fast versions?"

Eno: "'Amphetamine Ambient.'"

"These generative forms depend very much on the user actively making connections," Eno said. "In my art installations I always have sound and light elements that are completely unsynchronized, and people always assume that they are tightly synchronized. The synchronization occurs in them. "

With Eno noodling some live background music, Will Wright gave a demo of his game-in-progress, "Spore." It compresses 3.5 billion years of evolution into a few hours or days of game play, where the levels are Cell, Creature, Tribe, City, Civilization, Space." The game has potent editing tools, so that 30 mouse clicks can build a unique beautiful creature that would take weeks of normal computer generation, complete with breathing, eye blinks, and shrieks. The computer generates a related set of other creatures to meet— some to eat, some to avoid. Socialization begins, mating, then babies (using a "neonatal algorithm"), and on to tribes and cities with amazing buildings and vehicles the user designs. "You encounter civilizations built by other players, but the players don't have to be there for the civilizations to be alive and responsive."

Wright launched his civilization into space, having first abducted some creatures to plant on other planets for terraforming projects. The computer presented him an infinite variety of planets, some already occupied. Wright: "Oops. I seem to have inadvertently started an interplanetary war here." Eno: "Like America."

Building models, said Wright, is what we do in computer games, and it's what we do in life. First it's models of how the world works, then it's models of how other humans work. A significant new element in computer games is the profound command, "Restart." You get to explore other paths to take in the same situation. Eno: "That's what we do with everything I call culture, everything not really necessary, from how we wear our hair to how we decorate a cupcake. We try something, surrender

to it, and are encouraged to imagine what else might be tried."

It's interesting that just one verb is used both for music and for games: "play."

PS. For Eno's website for making your own version of his album with David Byrne, "My Life in the Bush of Ghosts, " go to: http://bushofghosts.wmg.com/home.php. For a glimpse of his new show, "77 Million Paintings by Brian Eno," soon to be fully online, see: http://markal.org/77_Million_Slideshow/. For a full Wikipedia article on Wright's "Spore," with lively links, check out: http://en.wikipedia.org/wiki/Spore_(game)

John Rendon

Long-term Policy to Make the War on Terror Short

July 14, 02006 http://longnow.org/seminars/02006/jul/14/long-term-policy-to-make-the-war-on-terror-short/

Summary

Written by Stewart Brand

Only connect

John Rendon, head of The Rendon Group, is a senior communications consultant to the White Houses and Departments of Defense. His subject in this talk is how to replace tactical, reactive response to terror with long-term strategic initative.

I think that people were expecting a silver-tongued devil, an accomplished spin-meister, arrogant but charming, who would dance them into some new nuanced state of understanding.

What they got instead from John Rendon was an earnest, soft-spoken message of such directness and scope that it apparently came across to some in the audience as dissembling.

Polarization rules in Washington these days, Rendon said, and in the country. Moderates are made voiceless. Civilized discourse is nearly impossible. And everyone is consumed with the pace of the news cycle, displacing any sense of the long view.

Meanwhile in the world the US has a severe “credibility deficit,” especially with the people in other nations. He said that his organization, The Rendon Group, has done detailed research on how the United States is perceived in Islamic countries. The universal message from Muslims was, “You look at us but you do not see us.” As for whether they felt positive or negative about the US, three groups emerged. Those who had some direct or even indirect contact with American people felt largely positive about the US. Those with more distant contact thought of the US only in terms of its corporations, such as McDonald’s, and had a more negative view. Those with no contact at all thought of the US strictly in

terms of its government, and had the most negative view of all.

“This is the key,” Rendon said. “The strength and credibility of the American people must be reflected in our government.”

“There are really two campaigns against terror,” Rendon said (he doesn’t like the term “war on terror”). The one being conducted against existing terrorists by the military and intelligence people, and by 76 countries, is going pretty well. But a second campaign, against potential terrorists, terrorists that we are creating, is barely understood. “When we say that our war is with ‘Islamic fundamentalists,’ 1.2 billion people think we mean them.”

“We need to turn Islamic street into an active ally, not a passive observer.” He gave an example of the kind of advice he gives US policy makers. When we focussed all our public attention on terrorist individuals, such as Bin Laden and Mullah Omar, we made just heroes of them. Focussing on the various named groups of terrorists has the same effect. But focus on specific terrorist tactics— such stopping a bus and then shooting everyone with a certain kind of name (as happened in Iraq) — puts world attention on something that might lead to changes of mind.

Rendon’s greatest fear is that the US could go isolationist at the very time we need most to engage the rest of the world, when we need for people everywhere “to feel that we care more about them than their own governments do.” For that strategic-level approach to policy he had a number of specific proposals:

- Let the third year of high school be mandatory overseas.
- US newspapers should partner out to the world, swapping journalists.
- College alumni programs should emphasize international students.
- Humanitarian assistance needs to be more enduring, as with Peace Corps programs.

- There should be a global endowment for education, and a global endowment for health care.
- Getting a visa to visit the US should be made welcoming instead of humiliating, as it is now.
- The US government needs to engage overseas "more as an enabler than as an actor."
- We need to be a better example of democracy by encouraging a convergent rather than divisive public discourse here at home.

It comes down to "networks and narratives," Rendon concluded. Five years from now what will be the narrative about the current five years taught in schools throughout the Islamic world and elsewhere? "The nature of that narrative will determine whether the conflict winds down in seven years or so, or it goes on for a hundred years."

I'll add one thing that emerged from the long and sometimes contentious questioning from the audience (download the audio this week for the full exercise). One question was, "Since weapons of mass destruction turned out to be nonexistent in Iraq, what is America's REAL agenda there and in the so-called war on terror? Is it oil, wealth, power, or what?" Rendon had nothing very satisfactory to offer in reply. At dinner after the talk, Danny Hillis suggested to Rendon what might be the root cause of the mutual bafflement. "People see a lot of seemingly irrational behavior and they assume there must be some hidden agenda driving it. What they don't realize is that having an agenda requires long-term thinking, and there isn't any going on."

That is pretty much John Rendon's point. When US policy consists mainly of a sequence of short-term reactions, the aggregate result is massive frustration.

Orville Schell

China Thinks Long-term, But Can It Relearn to Act Long-term?

September 22, 02006 http://longnow.org/seminars/02006/sep/22/china-thinks-long-term-but-can-it-relearn-to-act-long-term/

Summary

Written by Stewart Brand

Giant contradictions

“China is the most unresolved nation of consequence in the world,” Orville Schell began. It is defined by its massive contradictions. And by its massiveness— China’s population is estimated to be 1.25 to 1.3 billion; the margin of error in the estimate is greater than the population of France. It has 160 cities with a population over one million (the US has 49). It has the world’s largest standing army.

No society in the world has more millennia in its history, and for most of that history China looked back. Then in the 20th century the old dynastic cycles were replaced by one social cancellation after another until 1949, when Mao set the country toward the vast futuristic vision of Communism. That “mad experiment” ended with Deng Xiaoping’s effective counter-revolution in the 1980s, which unleashed a new totalistic belief, this time in the market.

So what you have now is a society sick of grand visions, in search of another way to be, focussed on the very near term.

These days you cannot think usefully about China and its potential futures without holding in your mind two utterly contradictory views of what is happening there. On the one hand, a robust and awesomely growing China; on the other hand a brittle China, parts of it truly hellish.

ROBUST CHINA

- Peaceful borders in all directions
- Economic, non-threatening engagement with the entire world, including with societies the US refuses to deal with

- 200 million Chinese raised out of poverty
- Private savings rate of 40 percent (it's 1 percent in the US)
- 300 million people with cell phones, and the best cell phone service in the world
- A superb freeway system built almost overnight
- New building construction everywhere, and some of it is brilliant
- 150 million people online
- 350,000 engineering graduates a year
- One-third of the world's direct investment
- Huge trade surplus
- And an economic growth rate of 9 to 12 percent a year! For decades.

but also…

BRITTLE CHINA

- Not much arable land, so a growing dependence on imported food
- Two-thirds of energy production is from dirty coal, by dirty methods, growing at the rate of 1-2 new coal-fired plants per week
- 30 percent of China has acid rain; 75 percent of lakes are polluted and rivers are polluted or pumped dry
- Of the 20 most polluted cities in the world, 16 are in China; you don't see the sun any more
- Some industrial parts of China are barren, hellish wastes
- Driven by environmental horrors and by widespread corruption, there were 87,000 instances of social unrest last year, going up every year
- The population is aging rapidly, with no pension or welfare, and a broken healthcare system
- The stock markets are grossly manipulated
- Public and official amnesia about historical legacies such as Tiananmen Square in 1989

How can such contradictions be reconciled? The best everyone can hope for is steady piecemeal change. For the Chinese the contradictions don't really bite so long as they have continued economic growth to focus on and to absorb some of the problems. But what happens when there's a break in that growth? It could come from inside China or from outside (such as a disruption in the US economy).

It's hard to look at the China boom now without thinking about the Japan boom in the 1970s and '80s, remembering how everyone knew the Japanese were going dominate the US and world economy, and we all had to study Japanese methods to learn how to compete. Then that went away, and it hasn't come back.

The leadership of China is highly aware of the environmental problems and is enlightened and ambitious about green solutions, but that attitude does not yet extend beyond the leadership, and until it does, not much can happen.

That's China: huge, consequential for everybody, and profoundly unresolved.

John Baez

Zooming Out in Time

October 13, 02006 http://longnow.org/seminars/02006/oct/13/zooming-out-in-time/

Summary

Written by Stewart Brand

Welcome to the Anthropocene

The graphs we see these days, John Baez began, all look vertical—carbon burning shooting up, CO2 in the air shooting up, global temperature shooting up, and population still shooting up. How can we understand what really going on? “It’s like trying to understand geology while you’re hanging by your fingernails on a cliff, scared to death. You think all geology is vertical.”

So, zoom out for some perspective. An Earth temperature graph for the last 18,000 years shows that we’ve built a false sense of security from 10,000 years of unusually stable climate. Even so, a “little dent” in the graph of a drop of only 1 degree Celsius put Europe in a what’s called “the little ice age” from 1555 to 1850. It ended just when industrial activity took off, which raises the question whether it was us that ended it.

Nobel laureate atmospheric scientist Paul Crutzen suggests that the current geological era should be called the “Anthropocene,” because it is increasingly dominated by human-caused effects. Baez noted that oil companies now can send their tankers through a Northwest Passage that they may have created, since it is fossil fuel burning that raised the CO2 that raised the summer temperatures in the Arctic that melts the polar ice away from the land.

Zoom out further still to the last 65 million years. The temperature graph shows several major features. One is the rapid (every 100,000 years) wide swings of major ice ages. When they began, 1.35 million years ago, is when humans mastered fire. But almost all of the period was much warmer than now, with ferns growing in Antarctica. “Now it’s cold.

What's wrong with a little warming?" Baez asked.

The problem is that the current warming is happening too fast.

Studies of 1,500 species in Europe show that their ranges are moving north at 6 kilometers a decade, but the climate zones are moving north at 40 kilometers a decade, faster than they can keep up. The global temperature is now the hottest it's been in 120,000 years. One degree Celsius more and it will be the hottest since 1.35 million years ago, before the ice ages. Baez suggested that the Anthropocene may be characterized mainly by species such as cockroaches and raccoons that accommodate well to humans. Coyotes are now turning up in Manhattan and Los Angeles. There are expectations that we could lose one-third of all species by mid-century, from climate change and other human causes.

Okay, to think about major extinctions, zoom out again. Over the last 550 million years there have been over a dozen mass extinctions, the worst being the Permian-Triassic extinction 250 million years ago, when over half of all life disappeared. The cause is still uncertain, but one candidate is the methane clathrates ("methane ice") on the ocean floor. Since methane is a far worse greenhouse gas than carbon dioxide, massive "burps" of the gas could have led to sudden drastic global heating and thus the huge die-off of species. Naturally the methane clathrates are being studied as an industrial fuel for when the oil runs out in this century, "which could make our effect on global warming 10,000 times worse," Baez noted.

"Zooming out in time is how I calm myself down after reading the newspapers," Baez concluded. "A mass extinction is a sad thing, but life does bounce back, and it gets more interesting each time. We probably won't kill off all life on Earth. But even if we do, there are a hundred billion stars in our galaxy, and ten billion galaxies in the observable universe."

Larry Brilliant, Katherine Fulton, Richard Rockefeller

The Deeper News About the New Philanthropy

November 3, 02006 http://longnow.org/seminars/02006/nov/03/the-deeper-news-about-the-new-philanthropy/

Summary

Written by Stewart Brand

Philanthropic stamina

10,000 families in the US, Katherine Fulton reported, have assets of $100 million or more. That's up from 7,000 just a couple years ago. Most of that money is "on the sidelines." The poor and the middle class are far more generous in their philanthropy, proportionally, than the very wealthy.

Philanthropy across the board is in the midst of intense, potentially revolutionary, transition, she said. There's new money, new leaders, new rules, new technology, and new needs. Where great wealth used to come mainly from inheritance and oil, now it comes from success in high technology and finance— and ideas and expectations from those business experiences inform (and sometimes over-simplify) the new philanthropy. Some of the great older institutions like the Rockefeller Foundation are radically reorganizing around new ideas and opportunities. But still the greatest amount comes from individuals, many of whom are now "giving while living" instead of handing over the task to heirs.

One major new instrument for philanthropy are the community foundations, "the mutual funds of philanthropy, where donors can outsource their strategy." There are 1,000 such organizations in the world, 700 of them in the US, led by innovators such as Acumen Fund, Social Venture Partners, New Profit Inc., and Women's Funding Network.

Online giving is growing rapidly, including the development of philanthropic marketplaces for direct, selective, fine-grain giving. Give India, for example, is a national marketspace of charity exchange. "By 2020," Katherine predicted, "we will see a headline, OPEN SOURCE

PHILANTHROPIC PORTAL TOPS $1 BILLION IN GIFTS.”

Katherine drew a matrix to classify kinds of philanthropy, with Short-term & Responsive on the left, Long-term & Systemic on the right; Personal & Local on the bottom, Global on the top. An important trend is from the lower left to upper right, from local and short-term toward global and systemic, exemplified by Bill Gates’s move from bringing computers to American schools to bringing health to Africa.

“Philanthropy is how we make the long now personal,” she said. The trait most often missing in philanthropy, including the new philanthropy, is stamina, patience. “Instead of rewarding success with continued funding, the givers get bored and look for something new. Really effective giving requires deep contextual understanding and tolerance for ambiguity. My advice to new donors is, ‘Pick at least one difficult and complex issue and stick with it, and join with others to work on it.’”

The greatest needs require philanthropic stamina but will also reward it. She quoted Danny Hillis: “There are problems that are impossible if you think about them in two-year terms— which everyone does– but they’re easy if you think if fifty-year terms.”

Richard Rockefeller and Larry Brilliant joined Katherine on the stage, and discussion got going that wound up lasting to 1am at dinner with the sponsors of the Seminar series. One subject was the isolation that often comes with great personal wealth. Katherine emphasized that donors have to visit up close with whatever they’re giving toward. Dr. Rockefeller supported that, describing how different his view was of Doctors Without Borders once he had worked with the physicians in the field in Peru and Nigeria. He said that
direct experience helps free you from lots of theories that are just wrong, and from philanthropy that is a projection of your own neuroses.

Questions from the audience revealed a continuing problem with the

whole social sector, which is the lack of clear mechanisms of self-correction and accountability. Government has checks and balances. Business has the bottom line. But “it’s hard to speak truth to philanthropy,” Katherine said. Richard said he looked closely at a $20 million effort by the Robert Wood Johnson to evaluate its programs and was unimpressed by the result. Larry Brilliant added, “And the new philanthropy is even less accountable
than the old.”

Over dinner the subject came back to the 10,000 families with over $100 million dollars, most of it inactive. One problem is that giving really large grants is harder than small grants. Only
universities are well geared to attract and receive the multi-million dollar gifts that result in named buildings and additions to already bloated endowments. New institutions and mechanisms are needed for directing large grants in new directions.

And something generational is going on, Katherine mused. The generation of Andrew Carnegie and Richard’s great grandfather John D. Rockefeller had a strong religious tradition that inspired them to public generosity and inventiveness. Those who came of age in the 1960s and early ’70s had their experience with political activism as a driver for later philanthropy. “But I notice that many who became adults during and after Ronald Reagan seem to have no framework at all for giving.”

Philip Rosedale

'Second Life:' What Do We Learn If We Digitize EVERYTHING?

November 30, 02006 http://longnow.org/seminars/02006/nov/30/second-life-what-do-we-learn-if-we-digitize-everything/

Summary

Written by Stewart Brand

2nd Life takes off

What is real life coming to owe digital life?

After a couple years in the flat part of exponential growth, the steep part is now arriving for the massive multi-player online world construction kit called “Second Life.” With 1.7 million accounts, membership in “Second Life” is growing by 20,000 per day. The current doubling rate of “residents” is 7 months, still shortening, which means the growth is (for now) hyperexponential.

For this talk the founder and CEO of “Second Life,” Philip Rosedale, tried something new for him— a simultaneous demo and talk. His online avatar, “Philip Linden,” was on the screen showing things while the in-theater Philip Rosedale was conjecturing about what it all means. “This is a game of ‘Can I interest you more in what I’m saying than what’s going on on the screen?’”

He showed how new arrivals go through the “gateway” experience of creating their own onscreen avatar, explaining that because intense creativity is so cheap, easy, and experimental, the online personas become strongly held. “You can have multiple avatars in ‘Second Life,’ but the overall average is 1.25 avatars per person.” The median age of users is 31, and the oldest users spend the most time in the world (over 80 hours per week for 10 percent of the residents). Women are 43 percent of the customers.

The on-screen Philip Linden was carrying Rosedale’s talk notes (handwritten, scanned, and draped onto a board in the digital world). Rosedale talked about the world while his avatar flew (”Everyone flies—

why not?") to a music club in which a live song performance was going on (the real singer crooning into her computer in real time from somewhere.) The singer recognized Philip Linden in the on-screen audience and greeted him from the on-screen stage.

"More is different," Rosedale explained. People think they want total and solitary control of their world, but the result of that is uninteresting. To get the emergent properties that make "Second Life" so enthralling, it has to be one contiguous world with everyone in it. At present it comprises about 100 square miles, mostly mainland, with some 5,000 islands (all adding up to 35 terrabytes running in 5,000 servers). Defying early predictions, the creativity in "Second Life" has not plateaued but just keeps escalating. Everybody is inspired to keep topping each other with ever cooler things. There are tens of thousands of clothing designers. Unlike the aesthetic uniformity of imagined digital worlds like in the movie "The Matrix," "Second Life" is suffused with variety. It is "the sum of our dreams."

The burgeoning token economy in "Second Life" is directly connected to the real-world economy with an exchange rate of around 270 Linden dollars to 1 US dollar. There are 7,000 businesses operating in "Second Life," leading this month to its first real-world millionaire (Metaverse real estate mogul Anshe Chung). At present "Second Life" has annual economic activity of about $70 million US dollars, growing rapidly.

As Jaron Lanier predicted in the early '90s, the only scarce resource in virtual reality is creativity, and it becomes valued above everything. Freed of the cost of goods and the plodding quality of real-world time, Rosedale explained, people experiment fast and strange, get feedback, and experiment again. They orgy on the things they think they want, play them out, get bored, and move on. They get "married," start businesses with strangers— "There are 40-person businesses made of people who have never met in real life." Real-world businesses hold meetings in "Second Life" because they're more fun and encourage a higher degree of

truth telling.

Pondering the future, Rosedale said that every aspect of the quality of shared virtual life will keep improving as the technology accelerates and the number of creators online keeps multiplying. (”Second Life” is now moving toward a deeper order of creativity by releasing most of its world-building software into open source mode.)

Real-world artifacts like New York City could become regarded like museums. “As the fastest moving, most creative stuff in our society increasingly takes place in the virtual world, that will change how we look at the real world,” Rosedale concluded.

Philip Tetlock

Why Foxes Are Better Forecasters Than Hedgehogs

January 26, 02007 http://longnow.org/seminars/02007/jan/26/why-foxes-are-better-forecasters-than-hedgehogs/

Summary

Written by Stewart Brand

Ignore confident forecasters

“What is it about politics that makes people so dumb?”

From his perspective as a psychology researcher, Philip Tetlock watched political advisors on the left and the right make bizarre rationalizations about their wrong predictions at the time of the rise of Gorbachev in the 1980s and the eventual collapse of the Soviet Union. (Liberals were sure that Reagan was a dangerous idiot; conservatives were sure that the USSR was permanent.) The whole exercise struck Tetlock as what used to be called an “outcome-irrelevant learning structure.” No feedback, no correction.

He observes the same thing is going on with expert opinion about the Iraq War. Instead of saying, “I evidently had the wrong theory,” the experts declare, “It almost went my way,” or “It was the right mistake to make under the circumstances,” or “I’ll be proved right later,” or “The evilness of the enemy is still the main event here.”

Tetlock’s summary: “Partisans across the opinion spectrum are vulnerable to occasional bouts of ideologically induced insanity.” He determined to figure out a way to keep score on expert political forecasts, even though it is a notoriously subjective domain (compared to, say, medical advice), and “there are no control groups in history.”

So Tetlock took advantage of getting tenure to start a long-term research project now 18 years old to examine in detail the outcomes of expert political forecasts about international affairs. He studied the aggregate accuracy of 284 experts making 28,000 forecasts, looking for pattern in their comparative success rates. Most of the findings were negative—

conservatives did no better or worse than liberals; optimists did no better or worse than pessimists. Only one pattern emerged consistently.

“How you think matters more than what you think.”

It’s a matter of judgement style, first expressed by the ancient Greek warrior poet Archilochus: “The fox knows many things; the hedgehog one great thing.” The idea was later expanded by essayist Isaiah Berlin. In Tetlock’s interpretation, Hedgehogs have one grand theory (Marxist, Libertarian, whatever) which they are happy to extend into many domains, relishing its parsimony, and expressing their views with great confidence. Foxes, on the other hand are skeptical about grand theories, diffident in their forecasts, and ready to adjust their ideas based on actual events.

The aggregate success rate of Foxes is significantly greater, Tetlock found, especially in short-term forecasts. And Hedgehogs routinely fare worse than Foxes, especially in long-term forecasts. They even fare worse than normal attention-paying dilletantes — apparently blinded by their extensive expertise and beautiful theory. Furthermore, Foxes win not only in the accuracy of their predictions but also the accuracy of the likelihood they assign to their predictions— in this they are closer to the admirable discipline of weather forecasters.

The value of Hedgehogs is that they occasionally get right the farthest-out predictions— civil war in Yugoslavia, Saddam’s invasion of Kuwait, the collapse of the Internet Bubble. But that comes at the cost of a great many wrong far-out predictions— Dow 36,000, global depression, nuclear attack by developing nations.

Hedgehogs annoy only their political opposition, while Foxes annoy across the political spectrum, in part because the smartest Foxes cherry-pick idea fragments from the whole array of Hedgehogs.

Bottom line… The political expert who bores you with an cloud of "howevers" is probably right about what's going to happen. The charismatic expert who exudes confidence and has a great story to tell is probably wrong.

And to improve the quality of your own predictions, keep brutally honest score. Enjoy being wrong, admitting to it and learning from it, as much as you enjoy being right.

(Iraq footnote. I asked Tetlock to opine on which experts were most right about how things have gone in the Iraq War. He said the most accurate in this case were the regional experts, who opposed the invasion, and what they are predicting now is a partition of Iraq into Kurdish, Shia, and Sunni areas.)

Vernor Vinge

What If the Singularity Does NOT Happen?

February 15, 02007 http://longnow.org/seminars/02007/feb/15/what-if-the-singularity-does-not-happen/

Summary

Written by Stewart Brand

Non-Singularity scenarios

Vinge began by declaring that he still believes that a Singularity event in the next few decades is the most likely outcome— meaning that self-accelerating technologies will speed up to the point of so profound a transformation that the other side of it is unknowable. And this transformation will be driven by Artificial Intelligences (AIs) that, once they become self-educating and self-empowering, soar beyond human capacity with shocking suddenness.

He added that he is not convinced by the fears of some that the AIs would exterminate humanity. He thinks they would be wise enough to keep us around as a fallback and backup— intelligences that can actually function without massive connectivity! (Later in the Q&A I asked him about the dangerous period when AI's are smart enough to exterminate us but not yet wise enough to keep us around. How long would that period be? "About four hours," said Vinge .)

Since a Singularity makes long-term thinking impractical, Vinge was faced with the problem of how to say anything useful in a Seminar About Long-term Thinking, so he came up with a plausible set of scenarios that would be Singularity-free. He noted that they all require that we achieve no faster-than-light space travel.

The overall non-Singularity condition he called "The Age of Failed Dreams." The main driver is that software simply continues failing to keep pace with hardware improvements. One after another, enormous billion-dollar software projects simply do not run, as has already happened at the FBI, air traffic control, IRS, and many others. Some large automation projects fail catastrophically, with planes running into each.

So hardware development eventually lags, and materials research lags, and no strong AI develops.

To differentiate visually his three sub-scenarios, Vinge showed a graph ranging over the last 50,000 and next 50,000 years, with power (in maximum discrete sources) plotted against human populaton, on a log-log scale. Thus the curve begins at the lower left with human power of 0.3 kilowatts and under a hundred thousand population, curves up through steam engines with one megawatt of power and a billion population, up further to present plants generating 13 gigawatts.

His first scenario was a bleak one called “A Return to MADness.” Driven by increasing environmental stress (that a Singularity might have cured), nations return to nuclear confrontation and policies of “Mutually Assured Destruction.” One “bad afternoon,” it all plays out, humanity blasts itself back to the Stone Age and then gradually dwindles to extinction.

His next scenario was a best-case alternative named “The Golden Age,” where population stabilizes around 3 billion, and there is a peaceful ascent into “the long, good time.” Humanity catches on that the magic ingredient is education, and engages the full plasticity of the human psyche, empowered by hope, information, and communication. A widespread enlightened populism predominates, with the kind of tolerance and wise self-interest we see embodied already in Wikipedia.

One policy imperative of this scenario would be a demand for research on “prolongevity”— “Young old people are good for the future of humanity.” Far from deadening progress, long-lived youthful old people would have a personal stake in the future reaching out for centuries, and would have personal perspective reaching back for centuries.

The final scenario, which Vinge thought the most probable, he called “The Wheel of Time.” Catastrophes and recoveries of various amplitudes follow one another. Enduring heroes would be archaeologists and

“software dumpster divers” who could recover lost tools and techniques.

What should we do about the vulnerabilities in these non-Singularity scenarios? Vinge ’s main concern is that we are running only one, perilously narrow experiment on Earth. “The best hope for long-term survival is self-sufficient off-Earth settlements.” We need a real space program focussed on bringing down the cost of getting mass into space, instead of “the gold-plated sham” of present-day NASA.

There is a common critique that there is no suitable place for humans elsewhere in the Solar System, and the stars are too far. “In the long now,” Vinge observed, “the stars are not too far.”

(Note: Vinge’s detailed notes for this talk, and the graphs, may be found online at:http://rohan.sdsu.edu/faculty/vinge/longnow/index.htm)

Brian Fagan

We Are Not the First to Suffer Through Climate Change

March 9, 02007 http://longnow.org/seminars/02007/mar/09/we-are-not-the-first-to-suffer-through-climate-change/

Summary

Written by Kevin Kelly

Catastrophic drought is coming back

There are two kinds of historians, Brian Fagan says, parachutists and truffle hunters. Parachutists command an overview of the landscape, while truffle hunters dig deeply to uncover marvelous treasures. Fagan is a parachutist. In his talk Fagan emphasized a wide view of human history as it unrolls in the landscape of climate. In our lookout from the parachute, we can see evidence from ice cores, tree rings, fossil pollen, and historical records, all pointing to the conclusion that people in the past have suffered through global warming periods before. So what happened?

Using data from truffle-hunting historians, Fagan told of how vineyard harvest records in Europe show that England became so warm during the period between 800-1250 AD that England not only had vineyards in its central provinces but it also exported wine to France. The medieval warm period had repercussions throughout society. Iceland and Scandinavia warmed up enough to grow cereal crops, tree lines elevated in mountain areas, and there were longer growing seasons everywhere on the continent.

This warming up of agriculture initiated the first vast clear-cutting of European forests. In the short 200 years between 1100 and 1300, from one-third to one-half of European wooded wilderness was deforested to make way for fields and pastures — shaping the lovely farm scenes we now associate with Europe. (Today only Poland has any remaining virgin forests).

Fagan says the myth of the medieval warm period is that it was warm. There were all kinds of weather extremes. In 1315 it started to rain for

seven years. The newly cleared and naked hills eroded, dams burst, disease spread, and prolonged drought followed.

And not just in Europe. Mesoamerica was jolted by long droughts. The Mayan pyramids at Tikal were engineered to act as water collection reservoirs. The collapse of their empire, and others in South America such as the Inca in Peru, are correlated to prolonged droughts.

Indeed, says Fagan, the elephant in the climate room is drought. As recently as the 1800s, prolonged droughts killed 20-30 million people in India during the British Raj period. We have a tendency to believe that modern technology has alleviated our susceptibility to drought, and it has — except for the billions of people on earth today who are living as subsistence farmers.

It is upon these people that Fagan wanted us to focus our attention and care, because it is upon these people that the most serious consequences of global warming will fall. Referring to his own experience of many years as an archeologist in Africa, he painted a vivid image of what a severe drought entails and how a drought can act like a cascading disruption and rapidly destroy a vibrant culture to the point where it disappears completely.

Forget the rocketing “hockey stick” of global warming, he urges. Even mild climate warming produces prolonged droughts, and we should expect more of them. There’s already been a 25% increase in droughts globally since 1990. In the next 100 years, we can expect the number of people to be affected by droughts to rise from 3% of the world’s population to 30%.

The lesson Fagan wanted us to leave with was that the effects of global warming will be felt greatest on marginal land and marginal peoples — many far from the sea and rising sea levels - and that because of their marginality, the consequences of prolonged drought will not just be

inconvenient, but devastating.

In the question and answer period, he was asked what the stricken people can do about it? “Move,” he said, “is the only option.” If the world is heating up, where would he move to? “Canada. It will be dryer, much warmer, and their politics are reasonable.”

Frans Lanting

Life's Journey Through Time

April 27, 02007 http://longnow.org/seminars/02007/apr/27/lifes-journey-through-time/

Summary

Written by Stewart Brand

The deep past in the remote present

It began on a New Jersey beach. Frans Lanting was photographing horseshoe crabs for a story about how they are being ground up for eel bait and at the same time their blood is used for drug testing—a $100 million industry. The crabs have primordial eyesight, which they employ mainly for finding sex partners. Photographing the horseshoes having a spawning orgy one spooky twilight, Lanting felt like he was suddenly back in the Silurian, 430 million years ago…

So Lanting and his wife Chris Eckstrom set out in search of "time capsules," places on the present Earth where he could find and photograph all the ancient stages of life. A two-year project expanded to seven years.

On a live volcano in Hawaii he found the naked planet of 4.3 billion years ago— molten rock flowing, zero life. "Your boots melt. You smell early Earth." On the western coast of Australia he shot a rare surviving living reef of stromatolites, made of the cyanobacteria that three billion years ago transformed the Earth by filling the atmosphere with oxygen. Lanting took pains to photograph without blue sky in the background, because the sky was not blue until the cyanobacteria had generated a planet's worth of oxygen.

Life's journey through time is a story of innovations, Lanting said. Lichens were the first to colonize land, followed by shelled creatures that could carry ocean inside them— crabs, turtles, and snails. In Australia Lanting photographed mudskippers—amphibious fish that use their pectoral fins to crawl around on mud and even climb trees.

Dinosaurs once browsed on land plants that defended themselves with ferocious spiky leaves. A survivor of that battle is the Araucaria tree in Chile. Lanting planted one in his garden near Santa Cruz and photographed it there.

Study of the first feathered reptile, the archaeopteryx, suggested that the contemporary bird with the most similar flight style is the frigate bird, and Lanting photographed one looking like an airborne fossil in the Galapagos Islands.

Asteroids and climate change made new niches and new innovations. Following the Cretaceous extinction 65 million years ago, mammals deployed their toothed jaws. Drier climate 25 million years ago created grasslands. When the forests dried, some apes took to walking upright in the savannahs of Africa. And some of those got around to analyzing DNA and noticing that life's entire history is written there.

Lanting ended his dazzling show with two demonstrations. One was an 8-minute segment of an hour-long orchestral version of "Life's Journey Through Time," composed by Philip Glass, with a brilliant multi-media version of Lanting's photos. The music and the image dynamics gain complexity stage by stage in synch with the growing complexity of life. (It would be glorious to see this performed locally with the San Francisco Symphony. The ideal occasion would be the opening of the new California Academy of Sciences building in Golden Gate Park next year.)

Lanting also did a quick demo of the timeline version of his photos (and videos) on his website. The level of its sophistication drew cheers and applause from the Web-savvy San Francisco audience. See for yourself: http://www.lifethroughtime.com/experience.html

The take home version of this talk is Lanting's book, *Life: A Journey Through Time*, and is a stunning oversized edition published by Taschen.

P.S. Lanting’s presentation in particular is worth seeing in high-quality video.

Steven Johnson

The Long Zoom

May 11, 02007 http://longnow.org/seminars/02007/may/11/the-long-zoom/

Summary

Written by Stewart Brand

Consilience defeats miasma

Steven Johnson began his long zoom survey with the "prior art" of Joyce's Stephen Daedalus locating himself in himself, his neighborhood, Dublin, on out to the universe. The value of a long zoom is in identifying and employing every scale between the very large and very small, noticing how they change each other when held in the mind at the same time.

Johnson's core story (and current book) concerned London in 1854, when it was the largest city in the world and in history with 2.5 million people. London famously stank. Cesspools filled basements, slaughterhouses were anywhere, garbage piled up.

Medicine at the time held that disease was caused by "miasma," foul air, noxious vapors. "All smell is disease," declared a Doctor Chadwick. The authorities decided that the way to cure the frequent cholera epidemics in London was to get rid of the bad odor— pump the sewage into the Thames, which people drank. The cholera got worse.

Johnson's goal with his book, *The Ghost Map*, was to figure out why the wrong theory of disease lingered so long, and what it took to correct it. The answer, he proposes, is in the perspective of the long zoom.

The celebrated story goes that John Snow discovered the polluted-water cause of cholera by drawing a "ghost map" of the cholera deaths concentrated around the Broad Street pump in Soho. What really happened is more interesting. Snow had been publishing his theory of water pollution causing cholera for five years. In August of 1854, a horrifying 10% of his neighborhood in Soho perished from the disease.

Then he drew up the map, drawing on public statistics provided by the city, and on the street savvy of a popular vicar named Rev. Henry Whitehead.

The map confirmed his theory and persuaded the medical establishment and city authorities. In just 12 years, cholera was completely eradicated from London.

In Johnson's view, one long zoom had displaced another. The miasma theory of cholera embraced a nested set of scales ranging, from large to small: *cultural traditions - urban development - technology - contemporary politics - "great men" - human sensory system*. Bad smell, bad people, bad disease.

With John Snow's map, a different long zoom took over: *cities - data systems - neighborhood - humans - organs - microbes*. The combination of city density and open-source data about the epidemic made the ghost map possible and persuasive. Doctor Snow noticed that the bodily symptoms of cholera looked like they were caused by something swallowed rather than something inhaled. The data had to be extremely strong to overcome the bias of human sensory apparatus— our alarm system of smell can detect minute amounts of contagion, but we cannot see them. It took a neighborhood map to defeat what the nose thought it knew.

Johnson proposed that another word for the long zoom perspective is "consilience"— a fine old word, revived by Edward O. Wilson, that links multiple disciplines and multiple levels into a whole body of knowledge with extra benefits the separate disciplines lack. Science and culture can blend rigorously. What is discovered in consilience is not just scales of distance or time but nested systems.

Johnson moved on to contemporary popular culture, drawing on his research for his brain book (*Emergence*) and his book on video games and

TV (*Everything Bad Is Good For You*). Back in the three-network days of "Gilligan's Island," the guiding principle was "least objectionable programming." Now with DVDs and TiVo, the guideline is "most repeatable programming"— material that will reward you if you study it again and again. Thus a current hit TV series about a very different island, "Lost," has a whole horde of characters and purveys many-leveled complexities and mysteries embracing *geography - economics - technology - sociology - biology - ontology*. Viewers are invited to wonder, among a great many other things, whether the whole damn thing is a dream, and, if so, whose?

Our brain is wired with "seeking circuitry" and relishes exercising "the regime of competence." TV shows like "Lost" and video games like "World of Warcraft" are addictive because they reward exploration. Instead of employing narrative arcs, they keep you in a state of being always challenged but not quite overwhelmed as you ascend from skill level to skill level.

We are learning to master complexity, to revel in long zooms like Google Earth or the forthcoming Will Wright game, "Spore." A few years ago, Johnson was introducing his 7-year-old nephew to Wright's early video game, "Sim City"— "Ooh, look at the big buildings!" Shortly, Johnson's factory district was failing. His nephew piped up. "Lower your industrial tax rate," said the child.

Johnson ended the talk with another line from James Joyce: "It was very big to think about everything and everywhere."

"It's never been easier," said Johnson.

PS… Also announced at this talk is the North American Premiere of Brian Eno's 77 Million Paintings.

Paul Hawken

The New Great Transformation

June 8, 02007 http://longnow.org/seminars/02007/jun/08/the-new-great-transformation/

Summary

Written by Stewart Brand

Humanity's immune system

The title of Paul Hawken's talk, "The New Great Transformation," has two referents, he explained. Economist Karl Polanyi's 1944 book, *The Great Transformation*, said that the "market society" and modern nation state emerged together in Europe after 1700 and divided society in ways that have yet to be healed.

Karen Armstrong's 2006 book, *The Great Transformation*, explores "the Axial Age" between 800 and 200 BC when the world's great religions and philosophies first took shape. They were all initially social movements, she says, acting on revulsion against the violence and injustice of their times.

Both books describe conditions in which "the future is stolen and sold to the present," said Hawken— a situation we are having to deal with yet again.

His new book, *Blessed Unrest*, was inspired by the countless business cards that earnest environmentalists would hand him after his lectures all over the world. After a while he had 7,000, and he wondered, "How many environmental groups are there in the world?" He began actively building a now-public database, WiserEarth.org, which includes social justice and indigenous rights organizations because he found they indivisibly overlap in their values and activities.

The database now has 105,000 such organizations. The still-emerging taxonomy of their "areas of focus" has 414 categories, amounting to a "curriculum of the 21st century"— Acid Rain, Living Wages, Tropical Moist Forests, Peacemaking, Democratic Reform, Sustainable Cities,

Environmental Toxicology, Watershed Management, Human Trafficking, Mountaintop Removal, Pesticides, Climate Change, Refugees, Women's Safety, Eco-villages, Fair Trade… Extrapolating from carefully inventoried regions to those yet to be tallied, he estimates there are over 1,000,000 such organizations in the world, adding up to the largest and fastest growing Movement in history.

The phenomenon has been overlooked because it lacks the customary hallmarks of a movement— no charismatic leaders, no grand theory or ideology, no "ism," no defining events. The new activist groups are about dispersing power rather than aggregating power. Their focus is on ideas rather than ideology— ideologies are clung to, but ideas can be tried and tossed or improved. The point is to solve problems, usually from the bottom up. The movement can never be divided because it is already atomized.

What's going on? Hawken wondered if humanity might have some collective intelligence that we don't yet understand. The metaphor he finds most useful is the immune system, which is the most complex system in our body— more complex than the entire Internet— massive, distributed, subtle, ingenious, and effective. The opposite of a hierarchical army, its power is in the density of its network. It deals with problems not through frontal attack but complex negotiation and rapprochement.

Much of the new movement, Hawken said, was inspired, at root, by the slavery abolitionists and by the Transcendentalists Emerson and his student Thoreau. Emerson declared that "everything is connected," and Thoreau wound up going to jail (and making it cool) by taking that idea seriously in social-justice terms.

Now, as in the Axial Age, activism comes from acting on the realization that "all life is sacred."

Francis Fukuyama

'The End of History' Revisited

June 28, 02007 http://longnow.org/seminars/02007/jun/28/the-end-of-history-revisited/

Summary

Written by Stewart Brand

Democracy versus Culture

Francis Fukuyama began by describing the four most significant challenges to the thesis in his famed 1992 book, *The End of History and the Last Man*. In the book he proposed that humanity's economic progress over the past 10,000 years was driven by the accumulation of science and technology over time. That connection is direct and reliable.

Less direct and reliable, but very important, is the sequence from economic progress to the adoption of liberal democracy. Political modernization accompanies economic modernization. This is a deep force of history, the book claims.

Fukuyama describes the rise of the idea of human rights in the West as a secularization of Christian doctrine. That led to accountability mechanisms— "You can't have good governance without feedback loops." Once there is a propertied middle class, they demand political participation. The threshold for that demand appears to about $6,000 per capita per year. It's hard to get to, but hundreds of millions of people in the world are making that climb right now.

China and Russia will be a test of his thesis, Fukuyama said. They are getting wealthier. If they democratize in the next twenty years, he's right. If they remain authoritarian, he's wrong.

Fukuyama is most intrigued by a challenge that comes from his old teacher and continuing friend, Samuel Huntington, author of *The Clash of Civilizations*. Culture can trump modernization, says Huntington— current radical Islam is an example. Fukuyama agrees that people at the fringe of modernization feel a sense of onslaught, and they can respond as

Bolsheviks and Fascists did in the 20th century. “A Hitler or a Bin Laden proclaims, ‘I can tell you who you are.’”

A second challenge to the universalism of liberal democracy is that it does not yet work internationally. Fukuyama agrees, noting that the major current obstacle is America’s overwhelming hegemony. He expects no solution from the UN, but an overlapping set of international institutions could eventually do the job.

A third challenge is the continuing poverty trap for so many in the world. Fukuyama says it takes a national state with the rule of law and time to learn from mistakes before you get economic takeoff. He sees later colonialism, done on the cheap (instead of with the patient institution building that England did in India), as a major source of the world’s current failed and crippled states.

The final challenge that impresses Fukuyama is the possibility that technology may now be accelerating too fast to cure its own problems the way it has done in the past. Climate change could be an example of that. And Fukuyama particularly worries that biotechnology might so transform human nature that it will fragment humanity irreparably.

While he sees meaning in history, Fukuyama said it’s not a matter of iron law. Human agency counts. History swerves on who wins a battle or an election. We are responsible.

Two further angles on Fukuyama’s thesis emerged at dinner. One concerned how society’s morality should express itself in dealing with the threat/promise of biotechnology. Conservative Fukuyama promoted strict government regulation while the liberals (and libertarians) in the room said the market and Internet should sort it out. Kevin Kelly asked Fukuyama, “Do you think human nature is as good as it can be?” I proposed to Washington-based Fukuyama that he was in the midst of a classic argument between the coasts. East Coast says, “Ready, aim, don’t

fire.” West Coast says, “Fire, aim, ready.”

Then there’s the European Union. In his talk Fukuyama praised it as the fullest realization of his theory. At dinner he acknowledged his concern that Europe may be headed toward permanent conflict with its growing immigrant populations, whose first allegiance continues to be to their own cultures.

Alex Wright

Glut: Mastering Information Though the Ages

August 17, 02007 http://longnow.org/seminars/02007/aug/17/glut-mastering-information-though-the-ages/

Summary

Written by Stewart Brand

A Series of Information Explosions

As usual, microbes led the way. Bacteria have swarmed in intense networks for 3.5 billion years. Then a hierarchical form emerged with the first nucleated cells that were made up of an enclosed society of formerly independent organisms.

That's the pattern for the evolution of information, Alex Wright said. Networks coalesce into hierarchies, which then form a new level of networks, which coalesce again, and so on. Thus an unending series of information explosions is finessed.

In humans, classification schemes emerged everywhere, defining how things are connected in larger contexts. Researchers into "folk taxonomies" have found that all cultures universally describe things they care about in hierarchical layers, and those hierarchies are usually five layers deep.

Family tree hierarchies were accorded to the gods, who were human-like personalities but also represented various natural forces.

Starting 30,000 years ago the "ice age information explosion" brought the transition to collaborative big game hunting, cave paintings, and elaborate decorative jewelry that carried status information. It was the beginning of information's "release from social proximity."

5,000 years ago in Sumer, accountants began the process toward writing, beginning with numbers, then labels and lists, which enabled bureaucracy. Scribes were just below kings in prestige. Finally came written narratives such as Gilgamesh.

The move from oral culture to literate culture is profound. Oral is additive, aggregative, participatory, and situational, where literate is subordinate, analytic, objective, and abstract. (One phenomenon of current Net culture is re-emergence of oral forms in email, twittering, YouTube, etc.)

Wright honored the sequence of information-ordering visionaries who brought us to our present state. In 1883 Charles Cutter devised a classification scheme that led in part to the Library of Congress system and devised an apparatus of keyboard and wires that would fetch the desired book. H.G. Wells proposed a "world brain" of data and imagined that it would one day wake up. Teilhard de Chardin anticipated an "etherization of human consciousness" into a global noosphere.

The greatest unknown revolutionary was the Belgian Paul Otlet. In 1895 he set about freeing the information in books from their bindings. He built a universal decimal classification and then figured out how that organized data could be explored, via "links" and a "web." In 1910 Otlet created a "radiated library" called the Mundameum in Brussels that managed search queries in a massive way
until the Nazis destroyed the service. Alex Wright showed an astonishing video of how Otlet's distributed telephone-plus-screen system worked.

Wright concluded with the contributions of Vannevar Bush ("associative trails" in his Memex system), Eugene Garfield's Science Citation Index, the predecessor of page ranking. Doug Engelbart's working hypertext system in the "mother of all demos." And Ted Nelson who helped inspire Engelbart and Berners-Lee and who Wright considers "directly responsible for the generation of the World Wide Web."

Rip Anderson, Gwyneth Cravens

Power to Save the World

September 14, 02007 http://longnow.org/seminars/02007/sep/14/power-to-save-the-world/

Summary

Written by Stewart Brand

Nuclear Footprint

In the early 1980s Gwyneth Cravens was one of the protesters against the Shoreham Nuclear Power Plant on Long Island, and also participated in ban-the-bomb rallies. After 15 years of deepening familiarity with nuclear power, she says she still would ban the bomb, but she now regrets that the Shoreham reactor was shut down.

Who changed her mind was a nuclear expert at Sandia Labs in Albuquerque, D. Richard Anderson, known as “Rip.” “Here was someone who thinks in thousands of years, about climate, about nuclear waste storage,” she said. “He applies to nuclear issues the same probabilistic risk assessment that helps us understand what we’re facing with climate change.”

One concept that altered Cravens’ perspective was realizing what “baseload” requires. Rip Anderson, on the stage with her, explained that baseload is the fundamental currency of grid power. It is massive power constantly available 24/7. It comes from only three sources— fossil fuels, hydro-electric dams, and nuclear. Hydro is maxed out. Fossil fuels have to be cut back to slow global warming. That leaves only nuclear growth to handle the expected doubling of energy demand in the world by 2030.

Anderson added that his first scientific discipline was oceanography, so one of his greatest concerns about CO2 loading of the atmosphere is that the resulting carbonic acid in the oceans is dissolving the calcifying organisms and could effectively end the crucial carbon sink that oceans provide.

Cravens went into detail about the harm brought by coal, which currently

provides 51% of US electricity (while hydro is 7%, nuclear 20%). Estimates are that coal pollution causes 24,000 deaths a year in the US, 400,000 a year in China (not counting the 5,000 who die annually in Chinese coal mines).

She also mentioned the still-incomplete science of the effects of low radiation— the amounts below 10,000 millirems. People encounter much higher levels of natural radiation at higher elevations and in some radon-rich areas, but there is no indication of higher cancer rates in those places. The fears of long-lingering cancer effects in the Chernobyl region have not proven out.

Comparing the environmental footprint of nuclear versus coal was the most persuasive mind-changer for Cravens. Coal involves vast quantities of mine spoil, vast quantities of fuel, vast quantities of pollution (including mercury and uranium), and vast quantities of carbon dioxide poured into the atmosphere. Nuclear, by contrast, uses the most concentrated form of energy in the world, the plants are small, and the waste amounts to one Coke can per person's lifetime of energy use.

There is said to be no geological repository for nuclear waste yet, but Rip Anderson pointed out that the WIPP (Waste Isolation Pilot Plant) in a deep salt formation in New Mexico has been operating since 1999. It now handles only military waste, but there is no reason except political that it could not take all of our civilian spent fuel.

Two questions from the audience addressed possible limitations on fast growth of nuclear energy in the world. One was, "Won't we quickly run out of uranium?" Anderson said that 10% of US electricity currently comes from recycled Soviet nuclear warheads, and we haven't begun to draw the energy from decommissioned US warheads. The price for uranium ore has been so low in recent decades that mines closed and discovery stopped. Now that the price is rising, mines are reopening and new reserves are being found. (They're mostly in Canada and Australia,

some in the US.) Meanwhile, spent fuel in the US still has 98% of its energy in it. Once we reprocess the spent fuel the way the rest of the world does, we will extract more of that energy, and the final amount of waste will be drastically smaller.

Second question: “Are there enough nuclear engineers in the pipeline to deal with a worldwide nuclear renaissance?” Answer: No. That’s the most limiting resource at this point.

Gwenyth Cravens is the author of *Power to Save the World.*

Juan Enriquez

Mapping the Frontier of Knowledge

October 12, 02007 http://longnow.org/seminars/02007/oct/12/mapping-the-frontier-of-knowledge/

Summary

Written by Stewart Brand

Mapping Life

“All life is imperfectly transmitted code,” Enriquez began, “and it is promiscuous.” Thus discoveries like the one last month of an entire bacterial genome inside the DNA of a fruitfly is exploding the old tree-of-life models of evolution. The emerging map replaces gene lineages with gene webs.

“There is a whole genomic continent to discover, and we’ve just mapped part of the coastline so far.” Noting that his friend Craig Venter has just transplanted the DNA from one microbe into a different one, and booted it up there, Enriquez said that humans are going to be increasingly designing and controlling the code of life. “We’ll do with bacteria what we do with our pets.”

Likewise new maps of brain function are raising questions such as, “Can we model the brain, can we download it, can we transplant it, can we reboot it?” Prostheses such as robotic arms used to be driven by muscle signals, but now they are being controlled directly from the brain.

Enriquez noted that some nations are charging ahead with such technology and the education that drives it while others cripple themselves by holding back. Portugal had colonies throughout the world, he said, but they never respected the natives enough to help educate them, and so left intellectual blight behind them and at home. London and Paris are full of Indian and Chinese restaurants, but there are none in Portugal. He showed a photo of a billboard that read: “Portugal— We were a world power for about 15 minutes.”

The new maps of life, he said, will profoundly affect countries, business,

religion and ethics. Being alive in the midst a scientific renaissance like this is Christmas every day.

During Q&A Enriquez lamented that the pharmacology industry has retreated to doing just marketing now instead of discovery, haven been driven into a defensive crouch by public misapplication of the "Precautionary Principle" that all new technologies are guilty until proven innocent, and innocence is impossible to prove. Thus the potential death of tens is used to head off treatments that could save tens of thousands. I asked him, "What would you call the opposite of the Precautionary Principle?" Kevin Kelly offered from the audience, "How about the Pro-actionary Principle?"

Rosabeth Moss Kanter

Enduring Principles for Changing Times

November 9, 02007 http://longnow.org/seminars/02007/nov/09/enduring-principles-for-changing-times/

Summary

Written by Stewart Brand

Principles against panic

“Everything looks like a failure in the middle.” Any new enterprise, Kanter explained, encounters roadblocks. As the obstacles multiply, the situation looks hopeless. That’s when deeply held principles and the long view are most needed to get you past the panic.

To characterize America’s current winter of discontent she quoted Woody Allen: “One path leads to despair and utter hopelessness. The other, to total extinction. Let us pray we have the wisdom to choose correctly.” Panic leads to abandoning principles, and that is how successes end.

Kanter commends three principles in particular for renewal of the faltering American enterprise…

* Open minds. In the clash between orthodoxy and creativity, opt for the spirit of discovery and progress.

* Higher purpose and sense of meaning.

Kanter noted the emergence of “values-based capitalism.” One example she knows from her own consulting work is IBM. Shortly after the new CEO Sam Palmisano took over in 2002, he instituted an online “ValuesJam” with 300,000 employees. The result was a declaration that IBM stands for “Innovation that matters— for our company and for the world.” She has seen that value played out in IBM public service activities such as the World Community Grid, which engages idle CPU time on computers connected to the Internet (740,000 so far) to solve scientific problems in HIV-AIDS, cancer, muscular dystrophy, and

human genomics.

* Common ground. Inclusiveness and shared responsibility is a particularly American principle first noted and celebrated by Alexis de Tocqueville. It is reflected in Bill Clinton's observation, "Big government is being replaced by big citizens."

There's been enough panic and winter in America, Kanter concluded. It's time for some endless summer. Get out and connect with the street, with nature, with the world.

Joline Blais, Jon Ippolito

At the Edge of Art

December 14, 02007 http://longnow.org/seminars/02007/dec/14/at-the-edge-of-art/

Summary

Written by Stewart Brand

Artibodies

Art, like the antibodies in our immune system, creates alien forces in service of the whole. It anticipates threats and models them. It is a diversity agent.

Two forms of that process were explained and shown by Ippolito and Blais: perversion, and execution.

One example of the perverse is the software called “Shredder” that takes any Web page and turns it inside out, making obvious what is hidden (the code) and small what is large (the surface images). You can try it here - give it a web page URL.

Another example is works of the Yes Men, a group of culture jammers whose art consists of what they call “identity correction.” One successful hoax was taking the guise of a Dow Chemical spokesman and announcing on BBC World that Dow was going to liquidate Union Carbide and use the 12 billion dollars to compensate everyone who had been harmed by the Bhopal disaster in India 20 years before. Dow’s stock plummeted, and the company had to announce it had no apology or payment to offer for Bhopal.

With the coming of code and the Web, art moves beyond being representational to something that can execute, can make things happen. For example, when the algorithm protecting DVDs was reverse engineered and offered publicly, the magazine 2600 was sued by the film industry. The defense that code was a form of speech protected by the First Amendment was unsuccessful in court. But on the Web the descrambling code was distributed in a variety of speech-like forms that

may be seen on the “Gallery of CSS Descramblers” site including a dramatic reading, a haiku, a T-shirt, a tie, a movie, and a version of the DVD logo containing the descrambling code.

Paul Saffo

Embracing Uncertainty: the secret to effective forecasting

January 11, 02008 http://longnow.org/seminars/02008/jan/11/embracing-uncertainty-the-secret-to-effective-forecasting/

Summary

Written by Stewart Brand

Rules of Forecasting

Reflecting on his 25 years as a forecaster, Paul Saffo pointed out that a forecaster's job is not to predict outcomes, but to map the "cone of uncertainty" on a subject. Where are the edges of what might happen? (Uncertainty is cone-shaped because it expands as you project further into the future— next decade has more surprises in store than next week.)

Rule: Wild cards sensitize us to surprise, and they push the edges of the cone out further. You can call weird imaginings a wild card and not be ridiculed. Science fiction is brilliant at this, and often predictive, because it plants idea bombs in teenagers, which they make real 15 years later.

Rule: Change is never linear. Our expectations are linear, but new technologies come in "S" curves, so we routinely overestimate short-term change and underestimate long-term change. "Never mistake a clear view for a short distance."

"Inflection points are tiptoeing past us all the time." He saw one at the DARPA Grand Challenge race for robot cars in the Mojave Desert in 2004 and 2005. In 2004 no cars finished the race, and only four got off the starting line. In 2005, all 23 cars started and five finished.

Rule: Look for indicators- things that don't fit. At the same time the robot cars were triumphing in the desert, 108 human-driven cars piled into one another in the fog on a nearby freeway. A survey of owners of Roomba robot vacuum cleaners showed that 2/3 of owners give the machine a personal name, and 1/3 take it with them on vacations.

Rule: Look back twice as far. Every decade lately there's a new

technology that sets the landscape. In the 1980s, microprocessors made a processing decade that culminated in personal computers. In the 1990s it was the laser that made for communication bandwidth and an access decade culminating in the World Wide Web. In the 2000s cheap sensors are making an interaction decade culminating in a robot takeoff. The Web will soon be made largely of machines communicating with each other.

Rule: Cherish failure. Preferably other people's. We fail our way into the future. Silicon Valley is brilliant at this. Since new technologies take 20 years to have an overnight success, for an easy win look for a field that has been failing for 20 years and build on that.

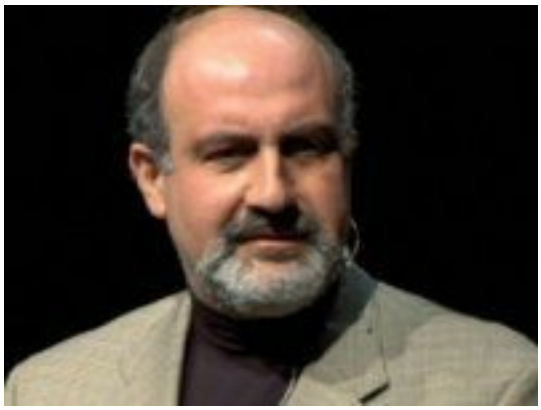
Rule: Be indifferent. Don't confuse the desired with the likely. Christian end-time enthusiasts have been wrong for 2,000 years.

Rule: Assume you are wrong. And forecast often.

Rule: Embrace uncertainty.

Saffo ended with a photo he took of a jar by the cash register in a coffee shop in San Francisco. The handwritten note on the jar read, "If you fear change, leave it in here."

PS… You can find different rules and a more strait-laced presentation by Saffo in his Harvard Business Review article, "*Six Rules for Effective Forecasting*," here.



Nassim Nicholas Taleb

The Future Has Always Been Crazier Than We Thought

February 4, 02008 http://longnow.org/seminars/02008/feb/04/the-future-has-always-been-crazier-than-we-thought/

Summary

Written by Stewart Brand

Dispatches from Extremistan

A “black swan,” Taleb explained, is an event which is 1) Hard to predict; 2) Highly consequential; 3) Wrongly retro-predicted. We pretend we know why the big event happened, and so entrench our inability to deal with the next world-changing improbable event.

Examples: Viagra, 9/11, Harry Potter, First World War, Beatles, the PC, Google, and the rise of any successful religion. History is dominated by sudden, lasting changes wrought by deeply unexpected events.

Part of the problem is that we ignore the “silent evidence” of the nonobserved and nonobservable. We compute probability from the success of survivors. No one writes or reads a book titled “How I Lost a Million Dollars.” Another problem is that we revise our own predictions and intentions unconsciously to match what actually happens. We disguise having been wrong by pretending we were right. This is “confirmation bias.”

There are TWO kinds of randomness, two realms in which events happen…

Mediocristan is dominated by the average— one new observation won’t change much. If you are measuring the weight of a large sample of humans, adding the heaviest person in the world won’t change the result, whereas measuring the average wealth of a large sample of humans would be transformed by adding the wealthiest person. Mediocristan is the realm of the Law of Large Numbers and of the Gaussian Bell Curve.

Extremistan is dominated by extremes. Every year 16,000 novels are

published in English. A handful of best-sellers absolutely dominate. This is the realm of the power-law curve and the Long Tail. Extremistant defies prediction. You can say there will be a few monsters and lots of midgets and the world will be changed by the monsters, and that's all you can say.

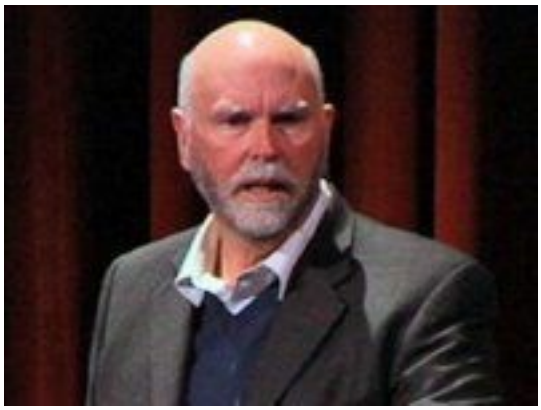
Benoit Mandelbrot convinced Taleb that the main dynamic of Mediocristan is energy, and the main dynamic of Extremistan is information. Anything social is Extremistan.

Thus there are two kinds of experts. A soufflé chef really is an expert and can be trusted. An economist is a pseudo-expert. "Never take advice from someone wearing a tie." All you get from a Council of Economic Advisors is an illusion of control. Stock market analysts have proved to be worse than nothing.

Don't focus on probability. Focus on consequences. Black Swans will come. Prepare against the negative ones; be ready to soar with the positive ones.

Pay attentive heed to tradition and old people— they have experienced more Black Swans.

PS… All of the SALT speakers perform for free. Taleb added the further generosity of insisting on paying for his travel and lodging. Extra thanks to him for that.



Craig Venter

Joining 3.5 Billion Years of Microbial Invention

February 25, 02008 http://longnow.org/seminars/02008/feb/25/joining-3-5-billion-years-of-microbial-invention/

Summary

Written by Stewart Brand

Decoding and recoding life

To really read DNA accurately and understand it thoroughly, you need to be able to write it from scratch and make it live, Venter explained.

His sequencing the first diploid human genome (with the genes from both parents) last year showed there is much more genetic variation between humans than first thought. His current goal is to fully sequence 10,000 humans and bring the price for each sequence down to $1,000. With that data, his says, “We’ll begin to really learn what’s nature and what’s nurture.”

“Microbes make up one half of the Earth’s biomass.” Venter’s shotgun sequencing of open-ocean microbial samples revealed that every milliliter of ocean has one million bacteria and archaea and ten million viruses even in supposedly barren waters. Taking samples on a round-the-world sailing trip showed that every 200 miles the genes in the microbes are 85% different.

“Microbes dominate evolutionary diversity,” Venter said. Some 50,000 major gene families have been discovered. Humans and other complex animals have a small fraction of that in our own genes, but the “microbiome” of our onboard microbes carry the full richness. Only 1/10th of the cells in a human are human; the rest are microbes. There are 1,000 species in our mouths, another 1,000 in our guts, another 500 on our skins, and those with vaginas have yet another 500 species.

Analysis has shown that a tenth of the chemicals used in our body come to us via our gut microbes. “We are what we feed our bacteria and what they give us.”

In an effort to determine what is the minimum gene set for life, Venter's team took a 500-gene bacteria and began knocking out genes. They got the viable set down to 400 and realized that the only way they are going to understand the complexity is by mimicking it. They would need to synthesize a working genome artificially, first on a computer and then with assembled base pairs and "boot it up" in a living cell, making a new, unique species. They devised techniques that repaired errors during synthesis, and they demonstrated that a genome from one kind of bacteria could be implanted in another and come to life there, changing one species into another. "It was true identity theft."

"This software builds its own hardware," Venter marveled.

He emphasized that synthetic biology does not re-do Genesis, but it does offer a kind of Cambrian explosion, building on 3.5 billion years of evolution to go in an infinity of possible directions. The range of possibilities is indicated by an existing organism that can take 1.75 million rads of radioactivity in 24 hours, which explodes its genome. It can reassemble the shattered genome and live on. It can go dormant for millions of years, and live on. That means life may already have migrated between planets.

Venter proposed that our current energy and climate situation requires truly disruptive technology. One project he's working on would use altered microbes to metabolize coal in the ground and generate methane, for a tenfold increase in carbon efficiency. Another project proposes a "4th generation biofuel," where engineered algae directly convert CO2 into hydrogen in bioreactors.

"Ten million genes are the design components of the future," Venter concluded. "With combinatorial genomics and casette-based construction, we can make millions of genomes per day."

During the Q & A I asked Venter why he spends so much of his time

speaking in public, 150 talks a year. He said he sees that as part of his scientific work, to prepare the public for the big changes coming. He wants to avoid repeating the mistakes made with genetically modified crops (GMOs), where there was insufficient transparency and regulation, and irrational opposition by environmentalists, which crippled a crucial field.

The public should feel it is included in every stage of genetic science and emerging biotechnology.

Niall Ferguson, Peter Schwartz

Historian vs. Futurist on Human Progress

April 28, 02008 http://longnow.org/seminars/02008/apr/28/historian-vs-futurist-on-human-progress/

Summary

Written by Stewart Brand

Past vs. Future

In what turned out to be a riveting evening, historian Niall Ferguson and futurist Peter Schwartz fire-hosed each other with enough ideas, frames of reference, ripostes, and eloquences to lead to a clear conceptual divergence. At the same time, the two were discovering, live in front of an audience, new ways they might work together on future projects.

Ferguson began by pointing out that while we face many futures, there is only one past, and its residents outnumber us--- only 6 percent of all humans are now alive. Historians, he said, "commune with the dead. We re-enact their thoughts, in their context and ours."

Historians look for rough regularities, such as he found in his analysis of the wars and hatred played out in the 20th Century. In his book, *The War of the World*, he describes how the combination of economic volatility, ethnic conflict, and failing empire always led to spirals of lethal violence. The advance of science and technology has not eliminated the possibility of violence but may have made it more powerful than ever. The three causes are still in play. "Our job is to keep them from coinciding again."

Ferguson ended with a critique of Schwartz's book on scenario planning, *The Art of the Long View*, which he thought showed signs of "heuristic bias." When Schwartz asked Ferguson to expand on that idea, Ferguson pointed out there was a whole chapter in the book about "The Global Teenager," which seemed spurious. It merely reflected Schwartz's personal experience: "You were a teenager when teenagers mattered. "

Historians also have heuristic biases, Ferguson added, such as their expectation that "great events should have great causes." Historians have

much to learn from complexity theory and evolution, he said. His own work with "counter-factual history" helps expose critical moments in history and provides a way to "think about what didn't happen." The counter-factual technique is an application of scenario thinking to the past.

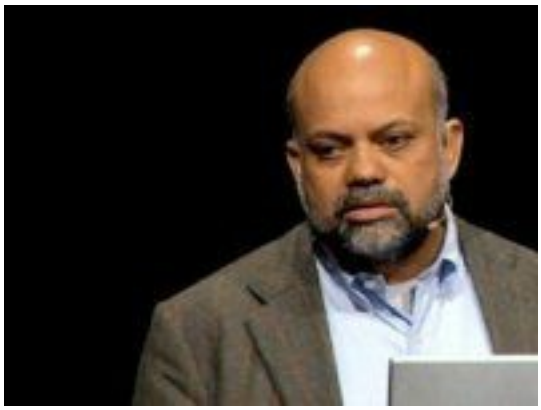
In Schwartz's opening remarks, he said that his plans to write a book titled *The Case for Optimism* were derailed by reading Ferguson's *The War of the World*. He's been grappling with the issues Ferguson raised for 18 months. "You do alternative pasts, I do alternative futures. Where historians commune with the dead, futurists have imaginary friends."

Schwartz characterized Ferguson's view of history as basically down, with an upside possibility, whereas his own view was of history as basically up, with always the possibility of getting things wrong. For Schwartz, the second half of the 20th Century showed an upside momentum, with a fraction of the violent deaths---5% of humans killed violently in the first half, 0.2 % in the second half. The Cold War ended quietly. Women were liberated. China took off. Prosperity accelerated. Everything from Wikipedia to cellphones empowered the grassroots.

In response, Ferguson noted Schwartz's "faith in technology" and proposed it reflected his training as an engineer. "Aren't you like the pre-1914 people who said that war was impossible because of all the new technology and commerce?" Schwartz agreed that the parallel is worrying.

Ferguson said, "I think our difference is that I'm a pessimist and you're an optimist. You're Pangloss and I'm Cassandra." Schwartz noted that since his parents were in slave-labor camps in World War II, and he was born in a displaced-person camp after the war, "It would be churlish not to be an optimist." Ferguson said, "That would make me skeptical about technology. The world leader in science and technology in 1940 was Nazi Germany."

Questions from the audience ended with one asking whether optimism or pessimism was a more useful way to think about the future. Schwartz said, "Optimism lets you imagine how you can overcome problems, and those possibilities motivate change." Ferguson said, "You must always focus on worst-case scenarios, and history will teach them to you."



Iqbal Quadir

Technology Empowers the Poorest

May 21, 02008 http://longnow.org/seminars/02008/may/21/technology-empowers-the-poorest/

Summary

Written by Kevin Kelly

Making Money WITH the Poor

When Iqbal Quadir applied to US colleges from his home town in Bangladesh he was surprised to discover that not all American universities were found in Washington, DC. That's how it was in Bangladesh, where everything of importance was centralized in the capital city, Dacca. He later realized that Bangladesh was not unique; in most developing countries, the infrastructure is concentrated in one or two cities, leaving the rural areas almost blank. As he acquired degrees and experience in finance, he realized that this centralization is not only a mark of poorer countries, it is probably a cause of their poverty.

Quadir presented this broad outline of development in order to give context for his belief that technology can alleviate poverty. He reminded us that 500 years ago, when the western countries were still "developing" their own societies, their political systems were no better, and often worse, than the instable corrupt regimes of many developing countries today. England had a series of kings who were impeached, arrested, ousted, or beheaded for their crimes. It was only after citizens were empowered by economic markets did the balance of power shift from the central king to decentralized citizens. All steps that devolve power away from a central authority — including laws, trade, and education — will raise democracy.

In Quadir's view, it's not that centralization per se creates poverty. Poverty is the natural beginning state of all societies, east or west. Rather, decentralization is the engine that removes poverty and brings wealth. To the degree that infrastructure, education, and trade can be decentralized, wealth will rise in proportion. To the degree that infrastructure, education and trade are centralized, poverty will remain.

Whereas many of us in the west, particularly the digital west, agree with this intuitively, we act contrary to this observation when we give large-scale aid to poor countries. As Quadir's colleague William Easterly argues in his book The Elusive Quest for Growth, the billions and billions of dollars spent on aid for developing countries has not only *not* helped, it has set them back decades. Aid, as we know it, kills development. This harm occurs because almost all previous aid has funneled through a central government or semi-governmental organizations and that official route tightens centrality. Even if the governments were saintly, and they are definitely not, the scale of money flowing through these centralizing nodes prohibits the distribution of resources, infrastructure, trade, and education. The more aid that arrives, the less development can actually happen.

Technology is the escape from this quandary. Quadir came to see that "technologies that connect" could liberate productivity. He matched his experience in Bangladesh as a 13-year-old boy having to walk 10 kilometers to get medicine, only to find out the medicine man he sought was not home, and then walking back empty handed, having wasted a day — all because there was no connection between his home and the pharmacist. Many years later in New York he wasted a day at work when there was no electricity to run phones or computers. Productivity required connectivity. If connectivity could be decentralized then it would lead to increased wealth.

Quadir settled on the cell phone as a way to decentralized connectivity. In the early 1990s cell phones were big, dumb, and very expensive. Calls were $3 per minute. Only the rich could afford them. But he wanted the poorest people in the world to get them. How would this be possible?

First, he believed in Moore's Law: that the phones would decrease in price and increase in power every year. That seemed inevitable to him. He said he could see "micro-chips marching toward the poor." He was right about that. Second, he piggybacked his hopes on a remarkable

invention of another Bangladeshi, Mohammad Yunus, who developed micro-financing (and later won a Nobel prize for this invention). In Yunus' scheme a woman who owned virtually nothing could get a loan of $200 to purchase a cow. She would then sell the surplus milk of the cow to pay back the loan, earn both milk and an income for her family, and maybe buy another cow. Ordinarily, no bank would have lent her this trifling amount because she had no collateral, no education, and the costs of overseeing such a small loan with small gains, would have been prohibitive. Grameen Bank, Yunus' creation, discovered that these illiterate peasants were actually more likely to repay these small loans, and were very happy to pay good interest rates, and so that in aggregate, these micro-loans were more profitable than loaning to large industrial players.

Quadir proceeded to ask, what if the women could rent a cell phone instead of a cow? Grameen Bank could make a micro-loan to the poor for the purchase a cell phone, which they then could sell/rent minutes to the rest of the village. The enterprising phone-renter would benefit and more importantly, the entire village would benefit from the connectivity. It did not really matter if the minutes were expensive, because when you have no connection, you are willing to pay dearly for it. Quadir started off his GrameenPhone with 5 cell towers, and eventually GrameenPhone erected 5,000 towers.

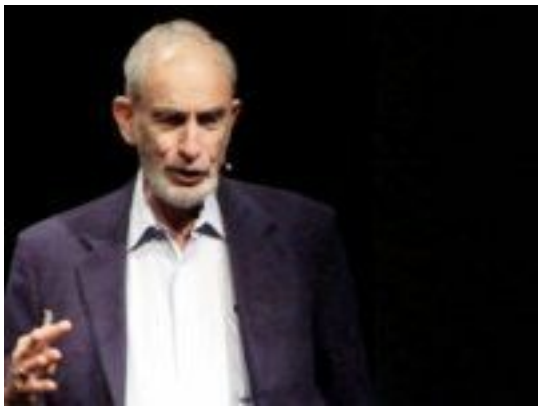
In 1993 when Quadir began, Bangladesh had one of the lowest penetrations of telephones on the planet — only one phone for every 500 people. GrameenPhone project unleashed 25 million phones. Today there are 100 times as many phones, or one per 5 people. Just as Quadir had envisioned, this decentralized connectivity has increased productivity. Without connectivity people waste a lot more time on economic errands. With cell connectivity farmers maximize their profits by getting real-time prices at distant markets; shepherds can call a vet, or order medicine. One study concluded that the total lifetime cost of an additional phone (including the cell tower and switching gear) was about

$2,000, but that each phone enabled $50,000 of increased productivity. And surprisingly, the poorer the country to begin with, the greater the increase in wealth from connectivity.

A lot of myths cloud the good intentions of developmental aid, Quadir says. Myths such as: poor countries have no resources, or that the poor don't have discretionary spending, or aren't concerned with brands, or aren't good credit risks, and so on. All these assumptions have been proven untrue over and over again, and especially so with GrameenPhone. The chief myth it dispelled was that government needs to subsidize technological development, when in fact there is good money to be made enabling the productivity of the poor. As Quadir says, "You don't make money on the poor, but with the poor." At dinner I asked Iqbal what he would have done differently with GrameenPhone. He replied, "Kept more shares."

Quadir is now searching for other technologies to decentralize, and thereby become a tool to erase poverty. He is director of the Legatum Center for Development and Entrepreneurship at MIT, which has been funded with $50 million. He is investigating whether energy can also be dethroned from its current mode of extremely centralized generation. Only 10% of the electricity produced at its source remains at the end of the wires as they reach homes and factories. Perhaps there are ways to decentralize its generation, which would trigger connections at the local level, and in his scheme, elevate wealth and democracy. If it worked, decentralized energy might also work in rich countries, increasing wealth and democracy in our part of the world as well.

Throughout his talk, Quadir reiterated: "To raise productivity (and wealth), raise connectivity. It's that simple."



Paul Ehrlich

The Dominant Animal: Human Evolution and the Environment

June 27, 02008 http://longnow.org/seminars/02008/jun/27/dominant-animal-human-evolution-and-environment/

Summary

Written by Stewart Brand

Becoming a Benign Dominant

To track how humans became Earth's dominant animal, Ehrlich began with a photo of a tarsier in a tree. The little primate had a predator's binocular vision and an insect-grabber's fingers. When (possibly) climate change drove some primates out of the trees, they developed a two-legged stance to get around on the savanna. Then the brain swoll up, and the first major dominance tool emerged—language with syntax.

About 2.5 million years ago, the beginnings of human culture became evident with stone tools. "We don't have a Darwin of cultural evolution yet," said Ehrlich. He defined cultural evolution as everything we pass on in a non-genetic way. Human culture developed slowly-the stone tools little changed from millennium to millennium, but it accelerated. There was a big leap about 50,000 years ago, after which culture took over human evolution—our brain hasn't changed in size since then.

With agriculture's food surplus, specialization took off. Inuits that Ehrlich once studied had a culture that was totally shared; everyone knew how everything was done. In high civilization, no one grasps a millionth of current cultural knowledge. Physicists can't build a TV set.

Writing freed culture from the limitations of memory, and burning old solar energy (coal and oil) empowered vast global population growth. Our dominance was complete. Ehrlich regretted that we followed the competitive practices of chimps instead of bonobos, who resolve all their disputes with genital rubbing.

"The human economy is a wholly-owned subsidiary of the Earth's natural systems," said Ehrlich, and when our dominance threatens the ecosystem

services we depend on, we have to understand the workings of the cultural evolution that gave us that dominance. The current two greatest threats that Ehrlich sees are climate change (10 percent chance of civilization ending, and rising) and chemical toxification of the biosphere. “Every cubic centimeter of the biosphere has been modified by human activity.”

The main climate threat he sees is not rising sea levels (”You can outwalk that one”) but the melting of the snowpack that drives the world’s hydraulic civilizations— California agriculture totally dependent on the Sierra snowpack, the Andes running much of Latin America, the Himalayan snows in charge of Southeast Asia. With climate in flux, Ehrlich said, we may be facing a millennium of constant change. Already we see the outbreak of resource wars over water and oil.

He noted with satisfaction that human population appears to be leveling off at 9 to 10 billion in this century, though the remaining increase puts enormous pressure on ecosystem services. He’s not worried about depopulation problems, because “population can always be increased by unskilled laborers who love their work.”

The major hopeful element he sees is that cultural evolution can move very quickly at times. The Soviet Union disappeared overnight. The liberation of women is a profound cultural shift that occurs in decades. Facing dire times, we need to understand how cultural evolution works in order to shift our dominance away from malignant and toward the benign.

In the Q & A, Ehrlich described work he’s been doing on cultural evolution. He and a graduate student in her fifties at Stanford have been studying the progress of Polynesian canoe practices as their population fanned out across the Pacific. What was more conserved, they wondered, practical matters or decoration? Did the shape of a canoe paddle change constantly, driven by the survival pressure of greater efficiency, or did the carving and paint on the paddles change more, driven by the cultural

need of each group to distinguish itself from the others.

Practical won. Once a paddle shape proved really effective, it became a cultural constant.

Edward Burtynsky

The 10,000-year Gallery

July 23, 02008 http://longnow.org/seminars/02008/jul/23/the-10000-year-gallery/

Summary

Written by Stewart Brand

Stone Ink Gallery

Photographer Edward Burtynsky made a formal proposal for a permanent art gallery in the chamber that encloses the 10,000-year Clock in its Nevada mountain. The gallery would consist of art in materials as durable as the alloy steel and jade of the Clock itself, and it would be curated slowly over the centuries to reflect changing interests in the rolling present and the accumulating past.

Photographs in particular should be in the 10,000-year Gallery, Burtynsky said, “because they tell us more than any previous medium. When we think of our own past, we tend to think in terms of family photos.”

But photographic prints, especially color prints, degrade badly over time. Burtynsky went on a quest for a technical solution. He thought that automobile paint, which holds up to harsh sunlight, might work if it could be run through an inkjet printer, but that didn’t work out. Then he came across a process first discovered in 1855, called “carbon transfer print.” It uses magenta, cyan, and yellow inks made of ground stone—the magenta stone can only be found in one mine in Germany—and the black ink is carbon.

On the stage Burtynsky showed a large carbon transfer print of one of his ultra-high resolution photographs. The color and detail were perfect. Accelerated studies show that the print could hang in someone’s living room for 500 years and show no loss of quality. Kept in the Clock’s mountain in archival conditions it would remain unchanged for 10,000 years. He said that making one print takes five days of work, costs $2,000, and only ten artisans in the world have the skill, at locations in Toronto, Seattle, and Cornwall. Superb images can be made on porcelain

(or Clock chamber walls), but Burtynsky prefers archival watercolor paper, because the ink bonds deep into the paper, and in the event of temperature changes, the ink and paper would expand and contract together.

The rest of the presentation was of beautiful and evocative photographs from three demonstration exhibits for the proposed gallery—"Museum of the Mundane" by Vid Ingelvics; "Observations from a Blue Planet" by Marcus Schubert; and "In the Wake of Progress" by Burtynsky himself. A typical Burtynsky photograph showed a huge open pit copper mine. A tiny, barely discernible black line on one of the levels was pointed out: "That's a whole railroad train." Alberta tar sands excavation tearing up miles of boreal forest. China's Three Gorges Dam. Mine tailing ponds beautiful and terrible. Expired oil fields stretching to the horizon. Michelangelo's marble quarry at Carrera, still working.

"This is the sublime of our time," said Burtynsky, "shown straight on, for contemplation." Indeed worth studying for centuries.

Daniel Suarez (aka author Leinad Zeraus)

Daemon: Bot-mediated Reality

August 8, 02008 http://longnow.org/seminars/02008/aug/08/daemon-bot-mediated-reality/

Summary

Written by Paul Saffo

Bot-dominated Reality

[Daniel Suarez, originally published as Leinad Zaurus, delivered a talk on the themes developed in his (originally self published) book *Daemon*. The book is now scheduled to be released in hard cover in January 02009 by Dutton.]

Forget about HAL-like robots enslaving humankind a few decades from now, the takeover is already underway. The agents of this unwelcome revolution aren't strong AIs, but "bots"– autonomous programs that have insinuated themselves into the Internet and thus into every corner of our lives. Apply for a mortgage lately? A bot determined your FICA score and thus whether you got the loan. Call 411? A bot gave you the number and connected the call. Highway-bots collect your tolls, read your license plate and report you if you have an outstanding violation.

Bots are proliferating because they are so very useful. Businesses rely on them to automate essential processes, and of course bots running on zombie computers are responsible for the tsunami of spam and malware plaguing Internet users worldwide. At current growth rates, bots will be the majority users of the Net by 2010.

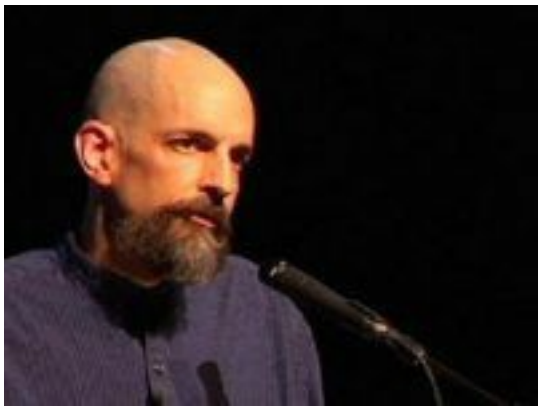
We are visible to bots even when we are not at our computers. Next time you are on a downtown street, contemplate the bot-controlled video cameras watching you, or the bots tracking your cellphone and sniffing at your Bluetooth-enabled gizmos. We walk through a gauntlet of bot-controlled sensors every time we step into a public space and the sensors are proliferating.

Bots are at best narrow AI, nothing that would make a cleric remotely

nervous. But they would scare the hell out of epidemiologists who understand that parasites don't need to be smart to be dangerous. Meanwhile, the Internet and the complex of processing, storage and sensors linked to it is growing exponentially, creating a vast new ecology for bots to roam in. Bots aren't evolving on their own — yet.

Left unchecked, bots will trap the human race because the automation they enable will make it possible for a few people to run humanity while the rest of us are unable to make decisions of any consequence. Bots are thus vectors for despotism, with the potential to create a world where only a small group of people understand how society works. In the worst case, the controls over bots disappear — for example, the only person who knows the password to a corporate bot dies– and the bots become autonomous.

We are in a Darwinian struggle with narrow AI, and so far at least the bots are winning. But there is a solution: build a new Internet hard-coded with democratic values. Start with an encrypted Darknet into which only verifiably human users can enter. Create augmented reality tools to identify bots in the physical world. Enlist the aid of a few tame bots to help forge a symbiotic relationship with narrow AI. Stir in some luck, and perhaps we can avoid the fate of the Sorcerer's Apprentice who rashly enchants a broom to do his tedious chores and ends up terrorized by his imperfect creations. We had better succeed, for unlike the fable, there is no Master Sorcerer ready to return to break the spell and save us from our folly.



Neal Stephenson

ANATHEM Book Launch Event

September 9, 02008 http://longnow.org/seminars/02008/sep/09/anathem-book-launch-event/

Summary

Written by Alexander Rose

Anathem book launch

Neal Stephenson's nearly thousand page tome *Anathem* was inspired in part by Long Now's 10,000 Year Clock project, and so a collaboration on the launch event was a natural fit. With over 900 in attendance the evening began with a performance of the elaborate math based chanting created for the book by composer David Stutz. Neal Stephenson then took the stage to read the first few pages of *Anathem*, and afterward he was joined on stage by Stewart Brand and Danny Hillis for a discussion about the book and Long Now.

Stephenson has been a friend of Long Now since its inception, even contributing some early ideas for the Clock itself. He has travelled to both Clock sites with Stewart Brand, Danny Hillis and Alexander Rose to get as much back story on the project as possible. *Anathem* takes place in another literary world entirely, but Stephenson does use much of the actual mechanisms that we have designed, and spins out a world in which 10,000 year clocks are not just an idea, but part of the civilizational fabric. Long Now's primary reason for building a monument scale icon to long-term thinking has always been to inspire new myths. Having one of the first of those myths created by Stephenson has not only been an honor, but a real instruction in how such a world might play out.

The evening also included a demonstration of "shovel-fu" a new martial arts form invented within the pages of *Anathem*, as well as a mathematical chanting exercise run by David Stutz at the end of the night.

You can read more about the connections between *Anathem* and Long Now on our site.

Peter Diamandis

Long-term X-Prizes

September 12, 02008 http://longnow.org/seminars/02008/sep/12/long-term-x-prizes/

Summary

Written by Stewart Brand

Beyond Audacious

Pursuing the idea of "revolution through competition" via huge-purse prizes was inspired for Peter Diamandis by reading about the Orteig Prize. In 1927 $25,000 was offered to the first person to fly non-stop from New York to Paris. Nine teams spent $400,000 in the competition. A 25-year-old named Lindbergh won the prize. Within 18 months air passengers had multiplied 30-fold from 6,000 to 180,000, the number of aircraft increased four-fold, and aviation stocks soared.

A lifelong space nut, Diamandis created out of thin air the Ansari X Prize. $10 million would go to the first team to make a 3-person reusable space vehicle that could reach 100 kilometers in altitude twice in two weeks. From 7 countries 26 teams competed, spending $100 million on the project. The success in 2004 of SpaceShipOne (now in the Smithsonian) launched a space tourism industry.

With the help of Google, the X Prize became a foundation to generate a series of competitions for "audacious and achievable goals." The attributes for a good Prize competition are: very large cash prize; clear objective and simple rules; a defined problem rather than defined solution; a target that had become stuck; something that attracts maverick thinkers; something whose success will change people's sense of what is possible.

Currently operative X Prizes include one for extremely cheap genome sequencing and one for a race of 100-mile-per-gallon cars. An example of how the prize process is learning is the Google Lunar X Prize to launch, land, and operate a rover on the Moon's surface. Diamandis wants the event to have time duration, not just be a flash in the pan, because

duration is what persuades people that something new is real. And he wants more mechanisms that help create an industry in the wake of the event. Thus the $30 million purse for this prize will be divided—$20 million to the first-place winner, $5 million to second place, and $5 million each for bonus goals such as photographing man-made objects on the Moon, surviving a lunar night, and detecting ice in a crater. So far the race has 15 registered teams competing.

X Prizes in the past have been for goals that could be achieved in a 3 to 8 year time frame. Now Diamandis wants to reach further in time and further into the realm of the seemingly impossible. He noted that only a short while ago a number of things were understood by everybody to be impossible: heavier-than-air flight; instant communications at a distance; transplanting a heart; space travel; cloning of a mammal; eradicating smallpox. What things are in that category now? And what would it take to get things moving in their direction?

Diamandis calls them Mega-X Prizes. They would have a purse of $100 million to $1 billion. (Not implausible; there are 1,200 billionaires in the world now.) As an example of how the economics could make sense, Diamandis points out that the current cost of AIDS is $80 billion a year, $800 billion a decade. A successful $1 billion X Prize for a cure for AIDS would be a hugely efficient economic event as well as a massive humanitarian breakthrough.

To conclude the evening, Diamandis offered the audience a list of 35 potential Mega-X Prize goals. Circle your top three choices, he said, and we'll tally the results. Rather than tell you what that particular audience chose, I'll pass on the list to you. What are your top three choices? What would you add to the list?…

- First (private) Human on Mars
- Faster-than-light Communications
- Organ Replacement

- First Baby Born off Earth
- Babelfish - Instant universal translator
- Flying cars
- Artificial Intelligence: Build a machine that passes the Turing Test
- Self-replicating (non-biological) machines
- Longevity: Double the length of the healthy human lifespan
- Cancer: Be able to detect any cancer at the 100-cell stage and Zap-it
- Predict Earth Quakes with >1 hour / >1 day notice
- Cure for AIDS
- Identify extra-solar life-bearing planet: Any type of replicating life from, single cell or greater
- SETI - Proof of extra-terrestrial intelligence
- NY to Paris in 30 min
- Private, fully-reusable, Orbital Spaceship
- Human to orbit for <$100,000
- Apollo 8: Privately fly 1 person around the moon and safely back to Earth.
- Robot Sports: (1) beat Tiger; (2) beat a championship soccer team; (3) beat a Formula-1 team
- Humans in Deep Ocean: 3 people to ocean bottom twice in 3 days.
- Image 100% of the Ocean Floor
- Backup the Biosphere: Create a data backup of the Internet and the top 10,000 species on Earth
- Replicator: create out of energy and raw materials anything.
- Energy Extraction - e.g. ZeroPoint; Cold Fusion
- Hot Fusion -- Sustained, net-energy positive
- Vision Restoration: Wire up a false eye for a blind person to gain 20:20 vision
- First brain transplant: full functioning of memory and motorfunction and lives > 1 day
- Download brain to a computer with all memory intact
- Brain to brain communication that are more than 10x the speed of audio conversations
- Develop real-time collective consciousness for a group of over 100

people

- Eradicate Hunger for > 90% of the human population
- Eradicate poverty for > 90% of the human population
- Carbon Sequestration: Create an economic device to extract/sequester carbon from the atmosphere
- Create an AI that can engage and educate children to their highest potential
- Develop a teaching system that allows an increase learning rates by an order of magnitude.

Huey Johnson

Green Planning at Nation Scale

October 3, 02008 http://longnow.org/seminars/02008/oct/03/green-planning-nation-scale/

Summary

Written by Stewart Brand

Green Plans

Green Plans, said Johnson, are government-run environmental programs that rise to the scale and longevity of environmental problems. Instead of acting piecemeal, they are comprehensive, systemic, integrated, and accountable. Instead of pursuing an energy policy, an air policy, and a water policy separately, you have to have one policy that covers them all.

He singled out three shining examples of how to make Green Plans work —Holland, New Zealand, and California's Global Warming Solutions Act of 2006 (AB 32).

In 1988 Queen Beatrix used her Christmas speech to tell the people of the Netherlands that "the earth is slowly dying," and the nation would disappear back under the sea if it did not solve its own environmental problems and inspire the rest of the world to do the same. The business community led the response, asking the government to set standards. The NGOs (which receive a third of their revenue from government grants) were expected to keep everybody's feet to the fire. The Dutch comprehensive Green Plan basically rewrote the nation's social contract. It took on every problem simultaneously with a trans-generational, trans-border approach. Environmental taxes replaced labor taxes. No waste was allowed to leave the country. The National Environmental Policy Plan is evaluated formally every four years and adjusted.

New Zealand in 1987 began research on what would become the biggest reform in its history, the Resource Management Act, which became law in 1991. Under the guiding principle of sustainability, the Act covers everything—air, water, soil, biodiversity, the coasts, and the full gamut of land use planning. The governance principle is "devolution," meaning

that most of the action covered by the Act takes place in regional, district, and city councils.

California's famous AB 32 is our most important legislation in a century, said Johnson. The goal of taking the state's greenhouse gas emissions back down to the 1990 level by 2020 requires radical action in every sector of the state's economy, including cars, mass transit, shipping, building materials, city design, and a cap-and-trade market for greenhouse gas emissions. The state is coordinating with six other western state and three provinces in Canada under what is called the Western Climate Initiative.

In the Q&A Johnson was asked what single action would do the most to improve environmental responsibility from the federal government. "Campaign finance reform," he said. The corruption of elected officials by special interest campaign donations makes them beholden to the wrong people for the wrong goals.

Johnson also has a low opinion of term limits. The great co-author of AB 32, Fran Pavley, was termed out after just six years in the State Assembly. If elected officials are always new in the capitol, they are easily manipulated by lobbyists and others who have been in town forever and have it wired.

Drew Endy, Jim Thomas

Synthetic Biology Debate

November 17, 02008
http://longnow.org/seminars/02008/nov/17/synthetic-biology-debate/

Summary

Written by Stewart Brand

Terms of Biocontainment

“I want to develop tools that make biology easy to engineer,” Drew Endy began. The first purpose is better understanding fundamental biological mechanisms through “learning by building.” The toolkit of Synthetic Biology starts with DNA construction and ascends through DNA parts, to devices, to standardized systems. An organism’s DNA code, and therefore the organism, can be digitally uploaded, stored, distributed, and downloaded. Life forms are programmable. So far 3,500 standard “BioBrick” parts have been developed for free distribution, and the number is growing geometrically. The number of amateur and student bioengineers also is growing geometicallly.

“There are 20,000 edible plant species,” Endy noted. “At present we eat only 30.” Synthetic biology can help diversify agriculture. Or how about engineering a gourd that can grow into a living house?

Endy concluded with five questions… Should teenagers practice genetic engineering? (Yes.) Should military weapons involve biotechnology? (No.) Should BioBrick parts be patented or freely shared? (Free.) Will biohackers be good or bad? (Good, if we help.) Should genetic engineers sign their work and publish it? (Yes.)

Jim Thomas asked Endy how he would defend against commercial interests locking up Synthetic Biology with patents? Endy said the best hope is building an open-source community that grows faster than businesses and out-innovates them.

Thomas began his statement by pointing out that it usually takes a whole generation to understand a new technology, so he urges moving slowly

and cautiously, but Synthetic Biology is advancing at breakneck speed, and the window of opportunity to have effective public discussion and control is closing.

He cited the history of synthetic chemicals, which began in mid-19th century. The technology quickly became highly concentrated in an oligarchy of monopolistic companies, and then it was easily commandeered by government in wartime. I.G. Farben supplied the poison gas for the death camps. “Powerful technology in an unjust world is likely to exacerbate the injustice.”

Thomas said he worries when he hears comments like, “Anything that can be made by a plant can be made by a microbe.” If that’s played out, it means the death knell for everyone who works in agriculture, a vast economic restructuring. There’s so much novelty coming so fast from Synthetic Biology, no predictive models or regulatory models can hold them. He recommends these new tools be strictly contained so there is no release of new life forms into the biosphere, and there should be no commercialization of the technology at all.

Endy asked Thomas if it’s okay to make anything in a bioreactor vat? Thomas said, “Yes, beer.”

For different reasons, both debaters wanted to see Synthetic Biology kept from domination by commercial patents. For Thomas, it would lead to unjust monopoly answering only to profit. For Endy, it would paralyze open-ended research.

Rick Prelinger

Lost Landscapes of San Francisco

December 19, 02008 http://longnow.org/seminars/02008/dec/19/lost-landscapes-of-san-francisco/

Summary

Written by Stewart Brand

Four Dimensional Cities

Cities are designed and built in three dimensions. Watching Prelinger's historic footage of San Francisco last night (to a more than overflowing crowd) reminds us however that one of the most compelling dimensions to a city is its fourth dimension - time.

The crowd gasped at an incomplete 280 freeway, and watched in amazement as horse and buggies dodged in and out of cable car traffic on Market Street in 01905. We sat silent watching the homeless of the forties, and cheered to see *Playland by the Beach* and Laughing Sal. Rick reminded us, "The past is not passé, it is prologue."

Most archives and libraries put up access barriers in response to copyright laws. In contrast Rick has attacked the vast amount of work that is either out of copyright, or left in the ambiguous gray zones, like home movies. We have always been told that there is no economic case for archives, the Prelinger Archive and Library not only upends that notion, but proves that access is the key, not protection.

Rick started out in 01982 as an amateur collector of the un-collected. He began by collecting film out-takes, esoteric commercial films, and all the other ephemera that is usually discarded by archives and libraries. Today he is a professional archivist who funds his collections by selling commercial access, AND giving it away. Rick pointed out that his archival sales go up the more he provides free access. The film student who uses a clip in film school often becomes a professional who buys the content later.

Most interesting in seeing this historic content was the contrast that it

draws to our modern sense of place, and the dramatic increase in documentation now going on. Today's Google Maps Street View shot is tomorrow's "Lost Landscape".

Saul Griffith

Climate Change Recalculated

January 16, 02009 http://longnow.org/seminars/02009/jan/16/climate-change-recalculated/

Summary

Written by Stewart Brand

The Terawatt World

Engineer Griffith said he was going to make the connection between personal actions and global climate change. To do that he's been analyzing his own life in extreme detail to figure out exactly how much energy he uses and what changes might reduce the load. In 2007, when he started, he was consuming about 18,000 watts, like most Americans.

The energy budget of the average person in the world is about 2,200 watts. Some 90 percent of the carbon dioxide overload in the atmosphere was put there by the US, USSR (of old), China, Germany, Japan, and Britain. The rich countries have the most work to do.

What would it take to level off the carbon dioxide in the atmosphere at 450 parts per million (ppm)? That level supposedly would keep global warming just barely manageable at an increase of 2 degrees Celsius. There still would be massive loss of species, 100 million climate refugees, and other major stresses. The carbon dioxide level right now is 385 ppm, rising fast. Before industrialization it was 296 ppm. America's leading climatologist, James Hanson, says we must lower the carbon dioxide level to 350 ppm if we want to keep the world we evolved in.

The world currently runs on about 16 terawatts (trillion watts) of energy, most of it burning fossil fuels. To level off at 450 ppm of carbon dioxide, we will have to reduce the fossil fuel burning to 3 terawatts and produce all the rest with renewable energy, and we have to do it in 25 years or it's too late. Currently about half a terawatt comes from clean hydropower and one terawatt from clean nuclear. That leaves 11.5 terawatts to generate from new clean sources.

That would mean the following. (Here I'm drawing on notes and extrapolations I've written up previously from discussion with Griffith):

"Two terawatts of photovoltaic would require installing 100 square meters of 15-percent-efficient solar cells every second, second after second, for the next 25 years. (That's about 1,200 square miles of solar cells a year, times 25 equals 30,000 square miles of photovoltaic cells.) Two terawatts of solar thermal? If it's 30 percent efficient all told, we'll need 50 square meters of highly reflective mirrors every second. (Some 600 square miles a year, times 25.) Half a terawatt of biofuels? Something like one Olympic swimming pools of genetically engineered algae, installed every second. (About 15,250 square miles a year, times 25.) Two terawatts of wind? That's a 300-foot-diameter wind turbine every 5 minutes. (Install 105,000 turbines a year in good wind locations, times 25.) Two terawatts of geothermal? Build 3 100-megawatt steam turbines every day-1,095 a year, times 25. Three terawatts of new nuclear? That's a 3-reactor, 3-gigawatt plant every week-52 a year, times 25."

In other words, the land area dedicated to renewable energy ("Renewistan") would occupy a space about the size of Australia to keep the carbon dioxide level at 450 ppm. To get to Hanson's goal of 350 ppm of carbon dioxide, fossil fuel burning would have to be cut to ZERO, which means another 3 terawatts would have to come from renewables, expanding the size of Renewistan further by 26 percent.

Meanwhile for individuals, to stay at the world's energy budget at 16 terawatts, while many of the poorest in the world might raise their standard of living to 2,200 watts, everyone now above that level would have to drop down to it. Griffith determined that most of his energy use was coming from air travel, car travel, and the embodied energy of his stuff, along with his diet. Now he drives the speed limit (and he has passed no one in six months), seldom flies, eats meat only once a week, bikes a lot, and buys almost nothing. He's healthier, eats better, has more

time with his family, and the stuff he has he cherishes.

Can the world actually build Renewistan? Griffith said it's not like the Manhattan Project, it's like the whole of World War II, only with all the antagonists on the same side this time. It's damn near impossible, but it is necessary. And the world has to decide to do it.

Griffith's audience was strangely exhilarated by the prospect.

Dmitry Orlov

Social Collapse Best Practices

February 13, 02009 http://longnow.org/seminars/02009/feb/13/social-collapse-best-practices/

Summary

Written by Stewart Brand

Managing social collapse

With vintage Russian black humor, Orlov described the social collapse he witnessed in Russia in the 1990s and spelled out its practical lessons for the American social collapse he sees as inevitable. The American economy in the 1990s described itself as “Goldilocks”—just the right size—when in fact is was “Tinkerbelle,” and one day the clapping stops. As in Russia, the US made itself vulnerable to the decline of crude oil, a trade deficit, military over-reach, and financial over-reach.

Russians were able to muddle through the collapse by finding ways to manage 1) food, 2) shelter, 3) transportation, and 4) security.

Russian agriculture had long been ruined by collectivization, so people had developed personal kitchen gardens, accessible by public transit. The state felt a time-honored obligation to provide bread, and no one starved. (Orlov noted that women in Russia handled collapse pragmatically, putting on their garden gloves, whereas middle-aged men dissolved into lonely drunks.) Americans are good at gardening and could shift easily to raising their own food, perhaps adopting the Cuban practice of gardens in parking lots and on roofs and balconies.

As for shelter, Russians live in apartments from which they cannot be evicted. The buildings are heat-efficient, and the communities are close enough to protect themselves from the increase in crime. Americans, Orlov said, have yet to realize there is no lower limit to real estate value, nor that suburban homes are expensive to maintain and get to. He predicts flight, not to remote log cabins, but to dense urban living. Office buildings, he suggests, can easily be converted to apartments, and college campuses could make instant communities, with all that grass turned into

pasture or gardens. There are already plenty of empty buildings in America; the cheapest way to get one is to offer to caretake it.

The rule with transportation, he said, is not to strand people in nonsurvivable places. Fuel will be expensive and hoarded. He noted that the most efficient of all vehicles is an old pickup fully loaded with people, driving slowly. He suggested that freight trains be required to provide a few empty boxcars for hoboes. Donkeys, he advised, provide reliable transport, and they dine as comfortably on the Wall Street Journal as they did on Pravda.

Security has to take into account that prisons will be emptied (by stages, preferably), overseas troops will be repatriated and released, and cops will go corrupt. You will have a surplus of mentally unstable people skilled with weapons. There will be crime waves and mafias, but you can rent a policeman, hire a soldier. Security becomes a matter of local collaboration. When the formal legal structure breaks down, adaptive improvisation can be pretty efficient.

By way of readiness, Orlov urges all to prepare for life without a job, with near-zero burn rate. It takes practice to learn how to be poor well. Those who are already poor have an advantage.

Daniel Everett

Endangered languages, lost knowledge and the future

March 20, 02009 http://longnow.org/seminars/02009/mar/20/endangered-languages-lost-knowledge-and-future/

Summary

Written by Stewart Brand

Language Revolution

The Pirahã tribe in the heart of the Amazon numbers only 360, spread in small groups over 300 miles. An exceptionally cheerful people, they live with a focus on immediacy, empiricism, and physical rigor that has shaped their unique language, claims linguist Daniel Everett.

The Pirahã language has no numbers or concept of counting (only terms for "relatively small" and "relatively large"); no kinship terms beyond immediate children and parents; no "left" and "right" (only "upriver" and "downriver"); no named distinction of past and future (only near time and far time); no creation stories or myths; and---most important for linguists---no recursion.

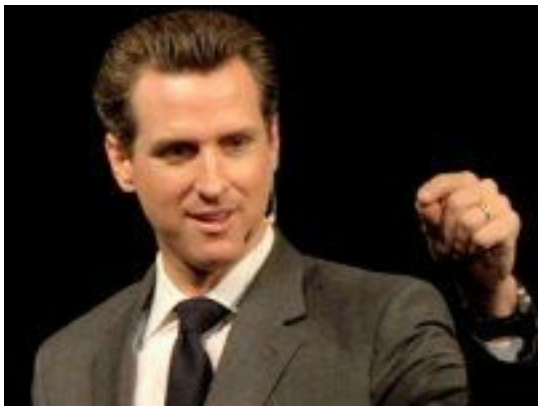
A recursive sentence like "The boy who was fishing owned the dog" does not occur in the Pirahã language. They would say, "The boy was fishing" and "The boy owned the dog." The eminent linguist Noam Chomsky has declared that recursion is an essential part of human language and is innate. Chomsky's former student Everett says that the Pirahã language proves otherwise. The resultant controversy is profound.

The Pirahã language is the simplest in the world. Speaking it and singing it are the same, and it can be hummed or even whistled, yet it can convey enormous richness. Among other things, the wide variety of verb forms are used to account for the directness of evidence for a statement. Everett originally went to the Pirahã in 1977 as a Christian missionary. They challenged him to provide evidence for the existence of Jesus, and lost interest when he couldn't. Eventually so did he. The Pirahã made him an atheist.

And the through him the Pirahã revolutionized how we think about language.

Some 40 percent of the world's 6,912 known languages are endangered, says Everett, and that endangers science. When we lose a language, we lose a whole way of life, a whole set of solutions to problems, a whole classification system and body of knowledge about the natural world, a whole calendar system, a whole complex of myths, folktales, and songs.

Everett spelled out what it takes to preserve a living language that is endangered. The land where the speakers live must be preserved, and their health should be protected. The language needs to be documented in detail. And you could do worse than make a donation to the Foundation for Endangered Languages.



Gavin Newsom

Cities and Time

April 8, 02009 http://longnow.org/seminars/02009/apr/08/cities-and-time/

Summary

Written by Stewart Brand

Sustainable Cities

Mayor Newsom began with how moved he was by hosting the UN's World Environment Day in San Francisco in 2005. For that event, which was called "Green Cities - Plan for the Planet!", he invited 120 mayors from around the world. Days of intense discussion led to the publication of 21 policy principles for building permanently sustainable cities, in the areas of energy, waste, design, nature, transportation, health, and water. Cities, Newsom said, consume 75% of natural resources and are responsible for 75% of pollution.

He became determined to help make San Francisco the Greenest city in the world.

That can be accomplished only with a plethora of highly specific programs. The city's renewable energy portfolio, for example, includes highly demanding Green building standards (LEED); conversion to biodiesel and the recycling of "fats, oils, and grease;" generous rebates for solar; and plans for collecting energy from tidal-flow turbines below the Golden Gate and wave generators off of Ocean Beach.

He wants San Francisco to be the world leader in electric vehicles, starting with plug-in hybrids and moving to fully electric. They have half the moving parts of gas vehicles and much higher efficiency. The batteries can charge in off-peak hours, and gas stations can convert to "switch stations," where you simply swap in charged batteries in less time than it takes to fill up with gas. The way cellphone time is sold in minutes, vehicle charging can be sold in miles.

He would like to see parking meters used for charging, and San Francisco

is developing congestion-price parking meters that cost more during peak congestion hours, and that sense and can broadcast when they're empty.

To encourage urban density, which is inherently Green, the city is building more highrises, and California's coming high-speed rail system will leave from the heart of downtown.

Newsom noted with glee that there is now intense competition between cities to out-Green each other. Portland, San Francisco, Manhattan, Amsterdam, Vancouver, Singapore and countless others vie in the quest for Green bragging rights. They borrow ideas and deploy comparative shame: "How can sunless Berlin have more solar power than any American city?"

Michael Pollan

Deep Agriculture

May 5, 02009 http://longnow.org/seminars/02009/may/05/deep-agriculture/

Summary

Written by Kevin Kelly

Making farmers cool again

Farming has become an occupation and cultural force of the past. Michael Pollan's talk promoted the premise - and hope - that farming can become an occupation and force of the future. In the past century American farmers were given the assignment to produce lots of calories cheaply, and they did. They became the most productive humans on earth. A single farmer in Iowa could feed 150 of his neighbors. That is a true modern miracle. "American farmers are incredibly inventive, innovative, and accomplished. They can do whatever we ask them, we just need to give them a new set of requirements."

The benefit of a reformed food system, besides better food, better environment and less climate shock, is better health and the savings of trillions of dollars. Four out of five chronic diseases are diet-related. Three quarters of medical spending goes to preventable chronic disease. Pollan says we cannot have a healthy population, without a healthy diet. The news is that we are learning that we cannot have a healthy diet without a healthy agriculture. And right now, farming is sick.

Pollan outlined what this recovery for American farmers and food producers should be. First a post-modern food system should be "resolarized." Right now it takes 10 calories of fossil fuel to manufacture 1 calorie of food on average, and 55 calories to produce 1 calorie of beef. If any industry should be solar-based it should be food, which was the "original solar economy." Instead, right now "we are eating oil." Cheap oil and farm policies subsidize the 5 main crops (and only those crops), upon which the rest of our cheap food system is based. These main crops are planted as monocultures, which require cheap pesticides and fertilizers and produce wastes that are all problems in themselves.

Pollan's solution is not to dismantle the food system but to redirect it. Because of the long-term planning and learning that stewarding land requires, he believes subsidies of some type are essential for agriculture. Agriculture, he stated, should not be a freemarket. By picking the proper incentives we can re-localize, re-solarize, and revive the healing power of balanced farms and wholesome gardens.

Governments should reward farmers for diversifying away from monocultures. Pollan gave a few examples of where this has worked at scale. They should be rewarded for growing cover crops with the benefit of reducing erosion. Rewarded for returning animals to the mix. Rewarded for the amount of carbon they sequester in soil. Rewarded for halting urban sprawl by keeping farmland intact. In fact farmland should find a similar status as wetlands; developers and communities get "credit" for retaining farmland. Farmers should be rewarded for localize food provision. If only 2% of government contracts for food (as in school lunch programs, or government-run hospitals) required that the food be produced within 100 miles, it would transform the food system.

How might such change happen? Only if consumers and citizens demand it. One thing that might help is if web cams and images of the actual feed lot, or slaughterhouse, were required to be available for food that flowed through it. Imagine getting a carton of milk that showed not a metaphorical alpine meadow, but the real cages of the real dirty cows that produced that liter of milk. Or put a second calories count on labels, this one showing how many calories of energy it takes to deliver the item to you.

The major problem with his vision? He says there are simply not enough farmers. Only 1 million now feed the US and other people of the world. Many more people, many more college educated people, many more innovators and entrepreneurs, and many more backyard gardeners need to produce this new food system. Start in educational programs, such as one promoted by Alice Waters, where kids learn to grow food, cook, and eat

smarter. “Make lunch an academic subject.” Follow the lead of Michelle Obama and make turning lawns into organic gardens fashionable, respectable.

Make farms and farmers cool again.

Paul Romer

A Theory of History, with an Application

May 18, 02009 http://longnow.org/seminars/02009/may/18/theory-history-application/

Summary

Written by Stewart Brand

New Cities with New Rules

This talk was the first in a series of public discussions of an idea that Romer has been working on for two years.

His economic theory of history explains phenomena such as the constant improvement of the human standard of living by looking primarily at just two forms of innovative ideas: technology and rules.

Technologies rearrange materials with ingenious recipes and formulas. More people create more technologies, which in turn generates more people. In recent decades technology has enabled the "demographic transition" which lowers birthrates and raises income per person even higher as population levels off.

Rules structure the interactions between people. As population density increased, the idea of ownership became an important rule. A supporting rule for managing violations replaced the old idea of deadly vengeance with awarding damages instead: simply shifting value replaced destroying value. For the idea of open science, recognition replaced ownership as the main event, which means that whoever publishes first is most rewarded, and that accelerates science.

Rules can amplify or stifle technological progress. China was the world leader in inventing new technologies until about a thousand years ago, when centralized dynastic rules slowed innovation almost to a stop.

Romer notes that business keeps evolving as new companies introduce new rule sets. The good ideas are copied, and workers migrate from failing companies to the new and old ones where the new rules are

working well. The same goes for countries. Starting about 1970, China took some of the effective rules of Hong Kong (which was managed from afar by England) and set up four special economic zones along the coast operating as imitation Hong Kongs. They worked so well that China rolled out the scheme for the whole country, and its Gross Domestic Product took off. “Hong Kong was the most successful economic development program in history.”

Romer suggests that we rethink sovereignty (respect borders, but maybe create new systems of administrative control); rethink citizenship (allowing perhaps for voice without residency as well as residency without voice); and rethink scale (instead of focussing on nations, focus on new cities.)

If nations are willing to experiment along these lines, they can create new places, places that can give more people access to the kind of rules that they would like to live and work under, and places that can sustain the historical process of entry and innovation in national systems of rules.

The idea is getting some traction in the developing world. This summer Romer will launch an institute and website for further exploration and eventual application of the idea.

One miracle of cities is that they sometimes renew themselves brilliantly. This could be a whole new form of that.

Raoul Adamchak, Pamela Ronald

Organically Grown and Genetically Engineered: The Food of the Future

July 28, 02009 http://longnow.org/seminars/02009/jul/28/organically-grown-genetically-engineered-food-future/

Summary

Written by Stewart Brand

Engineered organic

Organic farming teacher Raoul began the joint presentation with a checklist for truly sustainable agriculture in a global context. It must:

Provide abundant safe and nutritious food…. Reduce environmentally harmful inputs…. Reduce energy use and greenhouse gases…. Foster soil fertility…. Enhance crop genetic diversity…. Maintain the economic viability of farming communities…. Protect biodiversity…. and improve the lives of the poor and malnourished. (He pointed out that 24,000 a day die of malnutrition worldwide, and about 1 billion are undernourished.)

Organic agriculture has made a good start on these goals, he said, with its focus on eliminating harmful pesticides, soluble synthetic fertilizers, and soil erosion. Every year in the world 300,000 deaths are caused by the pesticides of conventional agriculture, along with 3 million cases of harm. Organic farmers replace the pesticides with crop rotation, resilient varieties of plants, beneficial insects, and other techniques.

But organic has limitations, he said. There are some pests, diseases, and stresses it can't handle. Its yield ranges from 45% to 97% of conventional ag yield. It is often too expensive for low-income customers. At present it is a niche player in US agriculture, representing only 3.5%, with a slow growth rate suggesting it will always be a niche player.

Genetically engineered crops could carry organic farming much further toward fulfilling all the goals of sustainable agriculture, Raoul said, but it was prohibited as a technique for organic farmers in the standards and

regulations set by the federal government in 2000.

At this point plant geneticist Pam took up the argument. What distinguishes genetic engineering (GE) and precision breeding from conventional breeding, she said, is that GE and precision breeding work with just one or a few well-characterized genes, versus the uncertain clumps of genes involved in conventional breeding. And genes from any species can be employed.

That transgenic capability is what makes some people nervous about GE causing unintended harm to human or ecological health. One billion acres have been planted so far with GE crops, with no adverse health effects, and numerous studies have showed that GE crops pose no greater risk of environmental damage than conventional crops.

Genetic engineering is extremely helpful in solving some agricultural problems, though only some. Pam gave three examples, starting with cotton. About 25% of all pesticide use in the world is used to defeat the cotton bollworm. Bt cotton is engineered to express in the plant the same caterpillar-killing toxin as the common soil bacteria used by organic farmers, *Bacillus thuringiensis*. Bt cotton growers use half the pesticides of conventional growers. With Bt cotton in China, cases of pesticide poisoning went down by 75%. India's cotton yield increased by 80%. Pam pointed out that any too-successful technique used alone encourages pests to evolve around the technique, so the full panoply of "integrated pest management" needs always to be employed.

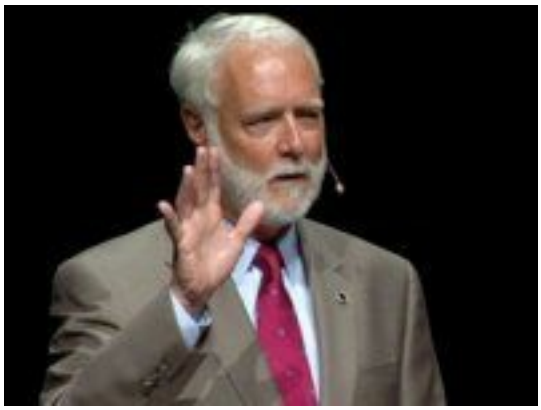
Her second example was papayas in Hawaii, where the entire industry faced extinction from ringspot virus. A local genetic engineer devised way to put a segment of the virus genome into papayas, thereby effectively inoculating the fruit against the disease. The industry was saved, and most of the papayas we eat in California are GE.

Rice is Pam's specialty at her lab in Davis. Half the world depends on

rice. In flood-prone areas like Bangladesh, 4 million tons of rice a year are lost to flooding—enough to feed 30 million people. She helped engineer a flood-tolerant rice (it can be totally submerged for two weeks) called Sub1. At field trials in Asia farmers are getting three to five times higher yield over conventional rice.

The cost of gene sequencing and engineering is dropping rapidly (toward $70 a genome), and our knowledge about how food crops function genetically is growing just as rapidly. That accelerating capability offers a path toward truly sustainable agriculture on a global scale.

Returning to the stage, Raoul doubted that certified organic farmers would ever be allowed to use GE plants, and so he proposed a new certification program for “Sustainable Agriculture,” that would include GE.



Wayne Clough

Smithsonian Forever

August 17, 02009
http://longnow.org/seminars/02009/aug/17/smithsonian-forever/

Summary

Written by Stewart Brand

The Smithsonian's long now

[Note for those who mentally enunciate words while reading: the last name is pronounced "Cluff."]

Secretary Clough reminded the audience that we own the Smithsonian, and what that amounts to is 19 museums and galleries containing 137 million objects, plus the National Zoo and 20 libraries. Each year the Smithsonian has 27 million visitors. In addition there are numerous research centers with activities in 88 countries.

That's the Smithsonian's short now—it's current profile to fulfill its abiding mission to help society understand and remember itself. The Institution's long now reaches back quite a ways and hopes to reach into the future well beyond the 300 years of national history it represents so far.

The greatest temporal reach comes from the one-sixth of all Smithsonian employees who engage in astronomy and astrophysics, operating such tools as the Kepler Telescope launched into orbit last March to discover remote planets that might harbor life and the Giant Magellan Telescope being built in Chile that will have the ten times the resolving power of the Hubble Space Telescope and may be able to examine the earliest remnants of the Big Bang fourteen billion years ago.

Much of our understanding of current climate hazards is coming from paleoclimatology. Ice core studies give us 800,000 years of data, but stratigraphic study of leaves is yielding crucial information about what happened 55 million years ago when the Earth warmed drastically and suddenly in what is called the Paleocene Eocene Thermal Maximum

(PETM). Clough described his visit with Smithsonian researcher Scott Wing doing field work in Bighorn Basin, Wyoming, where he saw evidence of palm trees growing in the area when the level of carbon dioxide in the atmosphere was three times what we have now, and the newly evolving horse was the size of cat because hot climates make for smaller animals.

Clough sees the long-term role of the Smithsonian as working with the constant tension between the permanent and the ephemeral and the full exploration of what he called “collaborative long-term thinking.” He ended with a quote from Smithsonian curator David Shayt: “There’s an accurate perception that we are forever…, that we will care for and honor an object eternally. That perception of immortality is very precious to people.”

Arthur Ganson

Machines and the Breath of Time

September 14, 02009
http://longnow.org/seminars/02009/sep/14/machines-and-breath-time/

Summary

Written by Stewart Brand

Dancing chairs

"You follow the feeling of the piece," Ganson explained, "and then wrestle it into physicality." As long as the idea is nonphysical, it is permanent; it becomes temporary as a physical device; and then it becomes permanent again in the mind of the viewer.

As Ganson spoke, a tiny chair walked meditatively around and around on a rock on the right side of the stage, projected live onto a video screen. (Thinking Chair.) No part in any of his kinetic art pieces is superfluous, he pointed out; everything functions. The piece should be crystal clear and also completely ambiguous. That's what allows each viewer to create their own story.

He showed a video of "Machine with Concrete." On the left an electric motor drives a worm gear at 212 revolutions a minute. A sequence of twelve 50-to-1 gear reductions slows the rotation so far that the last gear, on the right, is set in concrete. It would take over two trillion years for that gear to rotate. "Intense activity on one end, quiet stillness on the other," Ganson said. "It's a duality I feel in my own being."

The next video, "Cory's Yellow Chair," showed a chair exploding into six pieces, which hover at a distance, then gently reassemble, and instantly explode again. Ganson said he wanted the chair pieces to explode at infinite speed, rest in stillness at the extreme, then reassemble gradually. The piece is stab at the question of "when is now?" Now is when the chair coalesces, but it doesn't last.

Some of Ganson's machines inspire people to sit and watch them for hours. "Machine With Oil" does nothing but drench itself with

lubrication all day long. In "Margot's Other Cat" a soaring chair is set in random motion by an unsuspecting cat. The cat's motion is utterly determined; the chair has its own life.

During the Q&A, Alexander Rose asked the full-house audience how many of them of were makers of things. Ninety percent raised their hands in joy.

Stewart Brand

Rethinking Green

October 9, 02009 http://longnow.org/seminars/02009/oct/09/rethinking-green/

Summary

Written by Stewart Brand

Globalizing Green

Brand built his case for rethinking environmental goals and methods on two major changes going on in the world. The one that most people still don't take into consideration is that power is shifting to the developing world, where 5 out of 6 people live, where the bulk of humanity is getting out of poverty by moving to cities and creating their own jobs and communities (slums, for now).

He noted that history has always been driven by the world's largest cities, and these years they are places like Mumbai, Lagos, Dhaka, São Paulo, Karachi, and Mexico City, which are growing 3 times faster and 9 times bigger than cities in the currently developed world ever did. The people in those cities are unstoppably moving up the "energy ladder" to high quality grid electricity and up the "food ladder" toward better nutrition, including meat. As soon as they can afford it, everyone in the global South is going to get air conditioning.

The second dominant global fact is climate change. Brand emphasized that climate is a severely nonlinear system packed with tipping points and positive feedbacks such as the unpredicted rapid melting of Arctic ice. Warming causes droughts, which lowers carrying capacity for humans, and they fight over the diminishing resources, as in Darfur. It also is melting the glaciers of the Himalayan plateau, which feed the rivers on which 40% of humanity depends for water in the dry season---the Indus, Ganges, Brahmaputra, Mekong, Irrawaddy, Yangtze, and Yellow.

Global warming has to be slowed by reducing the emission of greenhouse gases from combustion, but cities require dependable baseload electricity, and so far the only carbon-free sources are hydroelectric dams

and nuclear power. Brand contrasted nuclear with coal-burning by comparing what happens with their waste products. Nuclear spent fuel is tiny in quantity, and you know exactly where it is, whereas the gigatons of carbon dioxide from coal burning goes into the atmosphere, where it stays for centuries making nothing but trouble. Brand declared that geological sequestering of nuclear waste has been proven practical and safe by the ten years of experience at the WIPP in New Mexico, and he paraded a series of new "microreactor" designs that offer a clean path for distributed micropower, especially in developing countries.

Moving to genetically engineered food crops, Brand noted that they are a tremendous success story in agriculture, with Green benefits such as no-till farming, lowered pesticide use, and more land freed up to be wild. The developing world is taking the lead with the technology, designing crops to deal with the specialized problems of tropical agriculture. Meanwhile the new field of synthetic biology is bringing a generation of Green biotech hackers into existence.

On the subject of bioengineering (direct intervention in climate), Brand suggested that we will have to follow of the example of beneficial "ecosystem engineers" such as earthworms and beavers and tweak our niche (the planet) toward a continuing life-friendly climate, using methods such a cloud-brightening with atomized seawater and recreating what volcanoes do when they pump sulfur dioxide into the stratosphere, cooling the whole world.

Green aversion to technologies such as nuclear and genetic engineering resulted from a mistaken notion that they are somehow "unnatural." "What we call natural and what we call human are inseparable," Brand concluded. "We live one life."

PS. Long Now likes to include a pointer to related reading. As it happens, the whole "Recommended Reading" section of my book *Whole Earth Discipline* is online, with 50 recommendations for books, magazines, and

websites, with live links. It's at: www.sbnotes.com

Interviews and Media

- Stewart Brand and Amory Lovins' debate about Nuclear Power on NPR's *On Point*
- Stewart Brand on Newsweek's *Techtonic Shifts*
- Review of *Whole Earth Discipline* on Worldchanging
- Interview with Stewart Brand on Huffington Post

Sander van der Leeuw

The Archaeology of Innovation

November 18, 02009 http://longnow.org/seminars/02009/nov/18/long-and-short-it/

Summary

Written by Stewart Brand

History of Innovation

The development of human mental ability can be tracked through the progressive crafting of stone tools, Van der Leeuw explained. First we learned to shape an edge---a line---then the surface, then the whole volume of the tool, then the sophisticated sequence required to make a superb spear point. It took 2 million years. But by 300,000 years ago the human brain had developed a sufficiently complex short-term working memory to keep 7 (plus-or-minus 2) considerations in mind at once. We could handle problems of multi-dimensionality.

The brain has not progressed since then, nor has needed to. The skills of innovation moved on from the biological brain to social constructs and modes of communication and information processing. That bootstrapping process continues to this day. The cave paintings show that cognitive agility reached the point of being able to reduce 3 dimensions to a representative 2 dimensions, for instance.

By the Neolithic revolution of 10,000 years ago, we developed the ability to shape voids---the interior of pots, baskets, and houses. Tools could be made by assembling parts instead of just paring down blanks of stone or wood. Problem solving in agriculture began to span time, to be a form of investment.

Towns and then cities became humanity's innovation engine. Symbols recorded in material form---tokens, accounting, and writing---spanned time and space. Unruly cities disciplined themselves with laws and administration. Then empires developed the ability to harvest the bounty of far-flung communities in the form of treasure, and that led to overreach. The Roman Empire was the first to degrade its world at the

local climate level, and it collapsed.

Around 1800, in Europe, energy constraints were finally conquered by the harvesting of fossil fuels. Humans only need 100 watts to survive, but every human now commands 10,000 watts. With that leverage we built a global civilization. The innovative power of urbanity has multiplied yet further with the coming of the Internet.

But we have become "disturbance dependent." As our cities and density of communications grow, they create ever more difficult problems, for which we have to innovate ever more sophisticated solutions. Technology is "the biggest Ponzi scheme of all."

As we become ever more adept at solving short-term problems, we shift the risk to long-term problems---such as climate change---which do not match the skills we have developed and know how to reward. We are headed into a trap of our own devising. To get out of it, if we can, will require a "battle with ourselves" to wholly redefine our social structures and institutions to master the long term.

Rick Prelinger

Lost Landscapes of San Francisco 4

December 4, 02009 http://longnow.org/seminars/02009/dec/04/lost-landscapes-san-francisco-4/

Summary

Written by Alexander Rose

Gas Stations, Not Flowers

The fourth incarnation of *Lost Landscapes of San Francisco* played to a sold out house at the Herbst Theater with the chanteuse Suzanne Ramsey opening the evening with a selection of historical San Francisco songs including the 01926 gem Masculine Women Feminine Men.

Rick Prelinger prefaced the footage with a brief introduction to his archive, process, and most of all a request to go into your mother's attic to pull out any films that feature San Francisco or the Bay Area. The archive needs your footage. Prelinger then queued up over seventy minutes of historic San Francisco footage starting with a heart stopping landing by an auto-gyro in City Hall Plaza. As always the audience was encouraged to participate by shouting both questions and answers posed by each segment. This year they were also bolstered by a trio of San Francisco city history buffs: Gray Brechin, Ed Holmes and Woody LaBounty, each with a particular angle on the city. New to the collection this year was wonderful multi-generational family footage from the Gee family who were also in the audience. In the question period at the end Stewart Brand asked what we should be doing now for the archivists of the future, Ricks answer, "shoot gas stations not flowers".

Most archives and libraries put up access barriers in response to copyright laws. In contrast Rick has attacked the vast amount of work that is either out of copyright, or left in the ambiguous gray zones, like home movies. We have always been told that there is no economic case for archives, the Prelinger Archive and Library not only upends that notion, but proves that access is the key, not protection.

Rick Prelinger's archive contains hundreds of historical films showing

San Francisco and Northern California history, the history of technology and industry, and everyday life. For future Lost Landscapes programs, he's looking for films and footage showing San Francisco and Northern California history, especially home movies and material shot by hobbyists or amateurs. He's interested in material that can become part of his archives, and will consider paying to copy footage of historical interest. He's reachable at rick@well.com.

Wade Davis

The Wayfinders: Why Ancient Wisdom Matters in the Modern World

January 13, 02010 http://longnow.org/seminars/02010/jan/13/wayfinders-why-ancient-wisdom-matters-modern-world/

Summary

Written by Stewart Brand

Native guidance

What does it mean to be human and alive?

The thousands of different cultures and languages on Earth have compellingly different answers to that question. "We are a wildly imaginative and creative species," Davis declared, and then proved it with his accounts and photographs of humanity plumbing the soul of culture, of psyche, and of landscape.

He began with Polynesians, the wayfinders who mastered the Pacific ocean in the world's largest diaspora. Without writing or chronometers they learned 220 stars by name, learned to read the subtle influence of distant islands on wave patterns and clouds, and navigated the open sea by a sheer act of integrative memory. For the duration of an ocean passage "navigators do not sleep."

In the Amazon, which used to be thought of as a "green hell" or "counterfeit paradise," living remnants may be found of complex forest civilizations that transformed 20 percent of the land into arable soil. The Anaconda peoples carry out five-day rituals with 250 people in vast longhouses, and live by stringent rules such as requiring that everyone must marry outside their language. Their mastery of botany let them find exactly the right combination of subspecies of plants to concoct ayahuasca, a drug so potent that one ethnobotantist described the effect of having it blown up your nose by a shaman as "like being shot out of a rifle barrel lined with Baroque paintings and landing in a sea of electricity."

In the Andes the Incas built 8,500 miles of roads over impossibly vertical

country in a hundred years, and their descendents still run the mountains on intense ritual pilgrimages, grounding their culture in every detail of the landscape.

In Haiti, during the four years Davis spent discovering the chemical used to make real-life zombies, he saw intact African religion alive in the practice of voodoo. "The dead must serve the living by becoming manifest" in those possessed. It was his first experience in "the power of culture to create new realities."

The threat to cultures is often ideological, Davis noted, such as when Mao whispered in the ear of the Dalai Lama that "all religion is poison," set about destroying Tibetan culture.

The genius of culture is the ability to survive in impossible conditions, Davis concluded. We cannot afford to lose any of that variety of skills, because we are not only impoverished without it, we are vulnerable without it.

PS. Wade Davis' SALT talk was based on his five Massey Lectures in Canada in 02009, which are collected in a book, *The Wayfinders: Why Ancient Wisdom Matters in the Modern World*.

Alan Weisman

World Without Us, World With Us

February 24, 02010 http://longnow.org/seminars/02010/feb/24/world-without-us-world-us/

Summary

Written by Stewart Brand

Humanity's impact, nature's resilience

Weisman's book, *The World Without Us*, grew out of two questions, he said. One was, "How can I write a best-seller about the environment?" The answer to that was the second question: "How would the rest of nature behave without the constant pressure we put on it?"

On the border of Ukraine and Belarus is a small intact remnant---500,000 acres---of the primordial forest that once covered Europe from Siberia to Ireland. In the Puszcza Bialowieska, with its towering ash and linden trees and dense growth, Weisman felt he was in the forest of Grimm's tales. "It felt primally familiar. It felt like being home. I realized that people really want that back."

Buildings and cities without us around don't last long, his research showed. Water gets into every building, followed by rot, birds, and trees, and pretty soon all that's left is the bathroom tiles. The same with cities. New York is built on top of 40 streams. To keep the subways functioning, 13 million gallons of water have to be pumped out every day. If the water returns, it won't be long before the tall buildings lose their footing and topple.

Maintenance people emerged as the heroes of the book, Weisman said. Without their vigilance and toil, everything collapses. They are the bedrock of civilization.

At the New York Botanical Garden Weisman found that the 40-acre preserve of carefully protected original forest has transformed itself over the years into a new woods dominated by alien plants such as ailanthus and cork trees. The garden's curator told him something radical:

"Maintaining biodiversity is less important than maintaining a functioning ecosystem. What matters is that soil is protected, that water gets cleaned, that trees filter the air, that a canopy generates new seedlings to keep nutrients from draining away into the Bronx River."

Plastic, Weisman discovered, is astonishingly durable, gradually accumulating in continent-sized gyres of floating garbage in the oceans. Instead of dissolving, the plastic just gets smaller in size and is ingested harmfully by every scale of animal all the way down to zooplankton.

Weisman's message is one of reconciliation. Wherever humanity backs its impact off even a little, nature comes swarming back. From the new part-wolf coyotes taking up residence in New England to the rare and exquisite red-crowned cranes prospering in Korea's Demilitarized Zone, accommodating nature always rewards humans.

Beth Noveck

Transparent Government

March 4, 02010 http://longnow.org/seminars/02010/mar/04/transparent-government/

Summary

Written by Stewart Brand

Dot.Gov

Noveck began with the example of patents, first devised in Renaissance Florence and Venice to protect techniques such as glass manufacture. In England, conferring a monopoly on a tool or technique became a prerogative of the king. In contemporary America, the process of getting a 20-year monopoly on your invention from the US Patent Office is mired in a morass of litigation costs, a huge backlog, insufficient reviewers with insufficient science education, and what Noveck calls "an outmoded conception of expertise."

Her revolutionary approach is to "reengineer institutions to bring in expertise from outside." Thus she developed Peer-to-Patent, which publishes patent applications to the Internet. The online community researches prior art, organizes the most excellent reviewers that emerge, and greatly accelerates and refines the patent review process. A pilot program proved the concept, and it is now being institutionalized at the Patent Office. Noveck describes the methodology as "focussed collaboration" and as a way to move power "downwards and outwards."

On President Obama's first day in office he signed a memorandum on Open Government, committing all the departments and agencies to "transparency, participation, and collaboration." They were asked to begin by identifying high-value datasets that could be put online in downloadable form immediately. The result was Data.gov, which went public in May 2009 and quickly had 64 million hits for its raw data files. An IT Dashboard of the government's information technology spending got 86 million hits. The White House made its visitor logs public.

Noveck said the government is replacing its reflex "there's a form for

that" habits with "there's an app for that," and a panoply of cloud-based apps, including 165 social media platforms, are on offer at Apps.gov. Just within the Department of Defense, the entire department has adopted (Long Now co-founder) Danny Hillis's Aristotle software to link all military expertise; the Army field manuals are being wikified---collaboratively updated by soldiers in the field; and troops are encouraged to learn and use social media.

The formidable Code of Federal Regulations used to cost $17,000. Now the price is zero for the "e-CFR."

"Loved data lives longer," Noveck declared. She encourages citizens to "adopt a dataset," and to demand ever wider release of government data troves. (One audience member requested that all the aerial photographs ever made by the US Geological Survey be digitized and published.) The Obama administration is finding that the whole process of opening up government digitally doesn't have to wait for perfection. It can move ahead swiftly on the Internet standard of "rough consensus and running code."

PS. As a government employee, Noveck is not allowed to plug her book, *Wiki Government*. But I can.

David Eagleman

Six Easy Steps to Avert the Collapse of Civilization

April 1, 02010 http://longnow.org/seminars/02010/apr/01/six-easy-steps-avert-collapse-civilization/

Summary

Written by Stewart Brand

Averting Collapse

Civilizations always think they're immortal, Eagleman noted, but they nearly always perish, leaving "nothing but ruins and scattered genetics." It takes luck and new technology to survive. We may be particularly lucky to have Internet technology to help manage the six requirements of a durable civilization:

1. "Try not to cough on one another." More humans have died from epidemics than from all famines and wars. Disease precipitated the fall of Greece, Rome, and the civilizations of the Americas. People used to bunch up around the infected, which pushed local disease into universal plague. Now we can head that off with Net telepresence, telemedicine, and medical alert networks. All businesses should develop a work-from-home capability for their workforce.

2. "Don't lose things." As proved by the destruction of the Alexandria Library and of the literature of Mayans and Minoans, "knowledge is hard won but easily lost." Plumbing disappeared for a thousand years when Rome fell. Inoculation was invented in China and India 700 years before Europeans rediscovered it. These days Michelangelo's David has been safely digitized in detail. Eagleman has direct access to all the literature he needs via PubMed, JSTOR, and Google Books. "Distribute, don't reinvent."

3. "Tell each other faster." Don't let natural disasters cascade. The Minoans perished for lack of the kind of tsunami alert system we now have. Countless Haitians in the recent earthquake were saved by Ushahidi.com, which aggregated cellphone field reports in real time.

4. "Mitigate tyranny." The USSR's collapse was made inevitable by state-controlled media and state-mandated mistakes such as Lysenkoism, which forced a wrong theory of wheat farming on 13 time zones, and starved millions. Now crowd-sourced cellphone users can sleuth out vote tampering. We should reward companies that stand up against censorship, as Google has done in China.

5. "Get more brains involved in solving problems." Undertapping human capital endangers the future. Open courseware from colleges is making higher education universally accessible. Crowd-sourced problem solving is being advanced by sites such as PatientsLikeMe, Foldit (protein folding), and Cstart (moon exploration). Perhaps the next step is "society sourcing."

6. "Try not to run out of energy." When energy expenditure outweighs energy return, collapse ensues. Email saves trees and trucking. Online shopping is a net energy gain, with UPS optimizing delivery routes and never turning left. We need to expand the ability to hold meetings and conferences online.

But if the Net is so crucial, what happens if the Net goes down? It may have to go down a few times before we learn how to defend it properly, before we catch on that civilization depends on it for survival.

Nils Gilman

Deviant Globalization

May 3, 02010 http://longnow.org/seminars/02010/may/03/deviant-globalization/

Summary

Written by Stewart Brand

The anti-state economy

Gilman described deviant globalization as "the unpleasant underside of transnational integration."

There's nice tourism, and then sex tourism, such as in Thailand and Switzerland. The vast pharmacology industry is matched by a vast traffic in illegal drugs. The underside of waste disposal is the criminal dumping in the developing world of toxic wastes from the developed world. Military activities worldwide are fed by a huge gray market in weapons. Internet communications are undermined by floods of malware doubling every year. Among the commodities shipped around the world are exotic hardwoods, endangered species, blood diamonds, and stolen art worth billions in ransom. Illegitimate health care includes the provision of human organs from poor people---you can get a new kidney with no waiting for $150,000 in places like Brazil, the Philippines, Istanbul, and South Africa. Far overwhelming legal immigration are torrents of illegal immigrants who pay large sums to get across borders. And money laundering accounts for 4-12% of world GDP---$1.5 to 5 trillion dollars a year.

These are not marginal, "informal" activities. These are enormous, complex businesses straight out of the Harvard Business Review. The drug business in Mexico, for example, employs 400,000 people. A thousand-dollar kilo of cocaine grows in value by 1400-percent when it crosses into the US---nice profit margin there.

The whole phenomenon is driven by state regulators acting on ethical taboos. When we outlaw or tax certain goods and services, we reduce supply while demand increases, and that provides an irresistible

opportunity for risk-taking entrepreneurs.

Also, historian Gilman points out, international development practices are partially to blame. From 1949 to 1989 the Cold War was played out with the US and USSR trying to create new states like themselves. It mostly failed, and it ended with the end of international Communism. Then came the neoliberal "Washington Consensus" theory of structural adjustment---governments in developing countries must "stabilize, privatize, and liberalize." That sort of worked, but it hollowed out the governments and dismantled their regulatory capacity. People in those countries realized they were on their own, forced to "survival entrepreneurship." In some places like Eastern Europe criminals took over the economy.

There is a certain Robin Hood effect on the large scale. Serious money is moving from the rich global north to the poor global south and enriching some people there.

Politically, the deviant entrepreneurs don't want to take over the state, just undermine it. For their own communities they often provide state-like services of infrastructure, health care, and even education. They are "post-modern, post-revolutionary, and post-progressive." They resort to violence against the state only when the state suddenly attacks them---as is playing out in Mexico now.

What to do? If you try to shut down the deviant economy, you just make the profit margins greater and exacerbate the problem. If you shrug and legalize everything, you condone hateful practices like child sex slavery and the total deforestation of tropical hardwoods.

We are left with making judicious choices about which deviant practices to take most seriously, and then dealing with them patiently in a non-sudden way, realizing that the unsavory economy will never be fully eradicated.

Ed Moses

Clean Fusion Power This Decade

June 16, 02010 http://longnow.org/seminars/02010/jun/16/clean-fusion-power-decade/

Summary

Written by Stewart Brand

Imminent fusion power

All the light we see from the sky, Moses pointed out, comes from fusion power burning hydrogen, the commonest element in the universe---3/4 of all mass. A byproduct of the cosmic fusion is the star-stuff that we and the Earth are made of.

On Earth, 4 billion years of life accumulated geological hydrocarbons, which civilization is now burning at a rate of 10 million years' worth per year. In 1900, 98% of the world's energy came from burning carbon. By 1970, that was down to 90%, but it has not decreased since. It has to decrease some time, because there is only so much coal, oil, and gas. During this century every single existing power plant (except some hydro) will age and have to be replaced, and world energy demand is expected to triple by 2100.

To head off climate change, fossil fuel combustion has to end by about 2050. The crucial period for conversion to something better is between 2030 and 2050. The ideal new power source would be: affordable; clean; non-geopolitical; using inexhaustible fuel and existing infrastructure; capable of rapid development and evolution. Moses' candidate is the "laser inertial fusion engine"---acronym LIFE---being developed at Lawrence Livermore.

The question, Moses said, is "Can we build a miniature Sun on Earth?" The recipe involves a peppercorn-size target of hydrogen isotopes deuterium and tritium heated to 200 million degrees Fahrenheit for a couple billionths of a second. To get that micro-blast of heat, the National Ignition Facility (NIF) uses lasers---coherent light---at a massive scale. Laser engineer Moses notes that photons are perfect for the job: "no

mass, no charge, just energy."

Moses ran a dramatic video showing how a shot at the NIF works. 20-foot-long slugs of amplified coherent light (10 nanoseconds) travel 1,500 yards and converge simultaneously through 192 beams on the tiny target, compressing and heating it to fusion ignition, with a yield of energy 10 to 100 times of what goes into it. Successful early test shots suggest that the NIF will achieve the first ignition within the next few months, and that shot will be heard round the world.

To get a working prototype of a fusion power plant may take 10 years. It will require an engine that runs at about 600 rpm---like an idling car. Targets need to be fired at a rate of 10 per second into the laser flashes. The energy is collected by molten salt at 1,000 degrees Fahrenheit and then heats the usual steam-turbine tea kettle to generate electricity. The engine could operate at the scale of a standard 1-gigawatt coal or nuclear plant, or it could be scaled down to 250 megawatts or up to 3 gigawatts. The supply of several million targets a year can be manufactured for under 50 cents apiece with the volume and precision that Lego blocks currently are. Moses said that 1 liter of heavy water will yield the energy of 2 million gallons of gas.

Fusion power, like nuclear fission power, would cost less per kilowatt hour than wind (and far less than solar), yet would be less capital intensive than fission. For the constant baseload power no carbon is involved, no waste stream, no possibility of meltdown or weaponization, and there is no such thing as peak hydrogen.

Frank Gavin

Five Ways to Use History Well

July 12, 02010 http://longnow.org/seminars/02010/jul/12/five-ways-use-history-well/

Summary

Written by Stewart Brand

History-savvy Policy

Why do policy makers and historians shun each other? Gavin observed that policy people want actionable information, certainty, and simple explanations. Meanwhile historians revel in nuance, distrust simple explanations and also distrust power and those who seek it. Thus historians keep themselves irrelevant, and policy makers keep their process ignorant.

Gavin proposed five key concepts from history that can inform understanding and improve policy dramatically...

Vertical History. What are the deep causative patterns behind a current situation? For example, America's deep involvement in the Mideast appears to be caused by concern about oil and terrorism and by support of Israel. But none of those elements applied in the mid-60s when we dove into the Mideast. Britain was Israel's keeper in those days and in financial trouble, the US was overextended in Vietnam and in financial trouble, and Soviet influence was the main threat in the Mideast. After the profound shock of the Six-Day War in 1967, Britain withdrew and America took over on the cheap with its "Pillar Strategy"---we would support Israel, Iran, and Saudi Arabia. That arrangement drives everything today, and policy people have almost zero memory of its origins.

Horizontal History. The interconnecting events of a particular moment---all the things simultaneously on the plate of a decision maker---profoundly affect decisions. For example, Presidents Kennedy and Johnson in the 60s were obsessed with America's balance of payments deficit and had to draw down our troop commitment in Germany, but

Europe was obsessed with keeping Germany from building nuclear weapons, and so the Nuclear Nonproliferation Treaty was invented as a workaround. That situational artifact leads US policy 40 years later.

Chronological Proportionality. "The New York Times always gets it wrong, and they're the best of the media," Gavin noted. Dramatic events take our attention away from what's really going on. For example, the Vietnam War dominated American attention in the 1960s and still looms large in every policy discussion. But the war was of no real geopolitical consequence, particularly when compared with the huge consequences from other little-noted 60s events---the Six-Day War, the Nuclear Nonproliferation Treaty, growing stability in Central Europe, and the thaw in relations between China and America. That raises the question: what is Afghanistan distracting us from these days?

Unintended Consequences. Suppose America had won in Vietnam? We would have had to commit huge resources to Southeast Asia indefinitely, and China and the USSR would have had to ally in the face of our military presence there. With our humiliating defeat, China and the Soviets split permanently, China and the US became friendly, and America profoundly reassessed and improved its own policies and institutions. So it goes in real life: things turn out differently than we expect.

Policy Insignificance. What policy people do is often not the main event at all. For example, in the mid-70s policy makers in Washington were trying to fix an America they saw in a steep decline and locked in an endless Cold War. They paid no attention to three events going on in California. Apple's computer in 1976 signaled a coming American dominance in computer and information technology. Also in 1976 a California wine (Stag's Leap) defeated the best French wines in a blind-taste contest, signaling our competitiveness in high culture internationally. And in 1977 "Star Wars" became the highest-grossing film ever, signaling American dominance of world pop culture. America's

greatest economic and cultural boom took off, totally without Washington's involvement or even awareness.

During the Q&A Galvin noted that Kennedy got the Cuban Missile Crisis right by locking all the dangerous heavy-hitters in a small room for thirteen days while he applied his own "historic sensibility" to finding a back-channel way to defuse the crisis rather than exacerbate it. These days, Gavin observed, policy people are worrying excessively about terrorism and nuclear weapons proliferation when in fact nuclear weapons are on the wane everywhere and have been for decades.

Historians, he said, can bring a well supported, authoritative, helpful message to the public discourse and to policy makers at such times: "Don't freak out."

Jesse Schell

Visions of the Gamepocalypse

July 27, 02010 http://longnow.org/seminars/02010/jul/27/visions-gamepocalypse/

Summary

Written by Stewart Brand

Gaming the World

In a glee-filled evening, Schell declared that games and real life are reaching out to each other with such force that we might come to a condition of "gamepocalypse---where every second of your life you're playing a game in some way. He expects smart toothbrushes and buses that give us good-behavior points, and eye-tracking sensors that reward us for noticing ads, and subtle tests that confirm whether product placement in our dreams has worked.

The reason games are so inviting is that they offer: clear feedback, a sense of progress, the possibility of success, mental and physical exercise, a chance to satisfy curiosity, a chance to solve problems, and a great feeling of freedom.

Accelerating technology has made some people give up on predicting the future, Schell said, but in fact it should make us much better predictors, because we get so much practice in finding out so quickly whether our predictions are right or wrong. He feels confident in predicting a number of driving forces that will make games subsume all other media and occupy ever more of real life. They are:

- Nooks & crannies---new niches for games in people's time, in specialty groups, in various world cultures.
- Microtransactions---which will really take off when they blend with social networking.
- New sensors---tilty smart phones are a glimpse of what disposable sensors everywhere might bring.
- New screens---live displays on everything.
- REM-tainment---lucid dreams as a play field.

- AdverGaming---commercialization money drives powerful innovation.
- Beauty---everything is getting gorgeous.
- Customization---you can already get personalized M&Ms.
- Eye and face tracking---universal face recognition is coming, and so is having your avatar reflect your real-face expressions.
- The curious will win---games so reward curiosity and fast learning that the incurious will be left behind.
- Authenticity---"real" constantly pushes toward real.
- Social networking---Facebook!
- Transmedia worlds---Pokémon showed the way, embracing a game, TV, cards, and toys.
- Speech recognition---soon you will have to persuade a computer character to do something.
- Geotracking---the real world becomes the screen.
- Sharing---Wikipedia showed its power.
- Quantitative design---detailed real-time analysis of what works in games drives exquisite adaptation.
- Extrinsic rewards---gold stars everywhere, but Schell recommends the book Punished by Rewards and believes that intrinsic rewards are better to promote because they last.
- Whole life tracking---the endpoint is immersion. Hopefully in what James Carse calls "the infinite game"---where the point is not in winning but in always improving the game.

Asked in the Q&A about short versus long games, Schell noted that massive multiplayer games have such scale and scope and offer such endless new goals and progress along with their social intensity that World of Warcraft now has 10 million players. We may well be passing our avatars on to our children and grandchildren.

Martin Rees

Life's Future in the Cosmos

August 2, 02010 http://longnow.org/seminars/02010/aug/02/lifes-future-cosmos/

Summary

Written by Stewart Brand

Cosmic Life

The pace of astronomic discovery, said the Astronomer Royal, keeps increasing with the constant improvement in our sensing technology. The recent discovery of the accelerating expansion of the universe (dark energy) revolutionized cosmology, and with the launch of the Kepler Telescope in 2009, we are beginning to detect and study Earth-sized planets around distant stars.

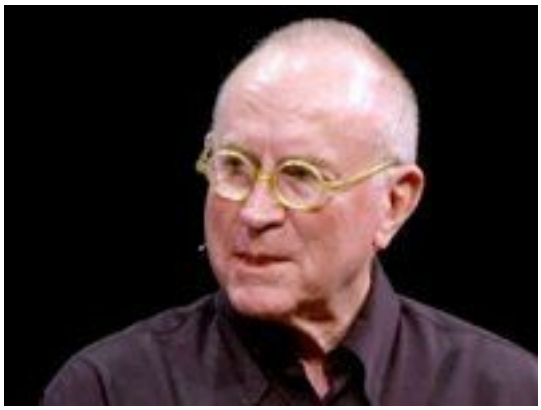
Since the Moon landings, humans in space have done little of scientific interest, but unmanned probes have delivered revelations from the planets and moons of the solar system, with much more to come. The best prospects for finding life elsewhere in our solar system appear to be on Mars, on Saturn's moon Titan, or on Jupiter's moon Europa. (Human space exploration is best pushed by private individuals such as Elon Musk, Jeff Bezos, and Richard Branson, rather than governments, Rees feels. Governments aren't allowed to be realistic about the dangers of space travel.)

"We are the nuclear waste of stellar fusion," Rees noted, the ash from long-dead stars all over the galaxy exchanging their gases in a complex ecology, and the galaxies show a mega-structure of density contrasts generated by gravity. Poised midway in scale between atoms and stars, biological life appears to be the peak of complexity in the universe---a flea is more complicated than a star.

Since we don't know how our own life emerged and haven't discovered any elsewhere, we still have no idea whether life is common in the universe or if we are unique. We can be certain that we are not the culmination of life forms here, because we are less than halfway through

the Sun's lifespan. In the six billion years to come, there are likely to be creatures as far beyond humans as we are beyond microbes, and science as far beyond our present understanding as quantum theory is remote to a chimpanzee.

Now that we are stewards of this planet, we are responsible for maintaining life's possibilities in this cosmic neighborhood.



Richard Rhodes

Twilight of the Bombs

September 21, 02010 http://longnow.org/seminars/02010/sep/21/twilight-bombs/

Summary

Written by Stewart Brand

Bomb Ban

The evening began with a short version of Isao Ishimoto's animation of all the world's atomic explosions in the period 1945 to 1998. The total is shocking to most people---2,053. Rhodes commented that seeing the bomb tests on a world map over time shows how much they were a strange form of communication between nations. He also noted how the number of tests dropped from decades of intensity to near zero after 1993. In this century only North Korea has tested bombs, and those could be the last explosions.

Most Americans, he's found, think that we don't have nuclear weapons any more, and that may reflect a realistic perception that we no longer need them. But our government keeps looking for reasons to keep them, and maintaining the current much reduced arsenal still costs $50 billion a year.

How much did the Cold War cost everyone from 1948 to 1991, and how much of that was for nuclear weapons? The total cost has been estimated at $18.5 trillion, with $7.8 trillion for nuclear. At the peak the Soviet Union had 95,000 weapons and the US had 20 to 40,000. America's current seriously degraded infrastructure would cost about $2.2 trillion to fix---all the gas lines and water lines and schools and bridges. We spent that money on bombs we never intended to use---all of the Cold War players, major and minor, told Rhodes that everyone knew that the bombs must not and could not be used. Much of the nuclear expansion was for domestic consumption: one must appear "ahead," even though numbers past a couple dozen warheads were functionally meaningless.

Rhodes noted that people fear the blast and radiation effects of atomic

bombs, but it's really the fires that are most destructive. The fireball ignites everything far beyond the blast effects. As a result, nuclear winter remains a threat. Former researchers of nuclear winter used sophisticated new climate models to assess what would happen if, say, there was an exchange of 100 Hiroshima-sized bombs (1.5 kilotons) between India and Pakistan. The smoke clouds would disrupt the weather long enough to collapse some agriculture, leading to starvation of as many as a billion people.

Serious efforts are underway to get the world's nuclear weapons down toward zero. All weapons-grade highly enriched uranium (HEU) is being tallied and secured. Sophisticated, unrestrained inspection systems are gaining ever more access. In some cases, arsenals are being "virtualized"---nuclear capability substitutes for weapons stockpiles. India and Pakistan, for instance, have disassembled their nuclear weapons into widely separated parts that would take considerable time and deliberation to reassemble.

In the course of his research, Rhodes shifted from opposition to nuclear power for electricity to becoming a strong proponent. Among its benefits is offering a way for the thousands of warheads to be converted into something useful when diluted into large quantities of reactor fuel. Also the international fuel banking proposed for bringing proliferation-free nuclear power to developing nations can help enable more thorough inspections of all fissile material.

At dinner Rhodes reflected that nuclear weapons may come to be seen as a strange fetishistic behavior by nations at a certain period in history. They were insanely expensive and thoroughly useless. Their only function was to keep a bizarre form of score.

Nineteen Speakers

Long Conversation

October 16, 02010 http://longnow.org/seminars/02010/oct/16/long-conversation/

Summary

Written by Alexander Rose

Long Conversation was a 6 hour relay of 19 minute one-to-one conversations among 19 speakers. Each speaker has an un-scripted conversation with the speaker before them, and then speaks with the next participant to come on stage before they themselves rotate off. The only instructions they were given was the over-arching theme of long-term thinking. Topics ranged from the inception of the 1000 year Longplayer composition to the NASA/DARPA 100 Year Starship program announced publicly for the first time.

At the live event the Long Conversation was interpreted in real time though a data visualization performance by Sosolimited; an art and technology studio out of M.I.T. Long Conversation was also presented with a live performance of 1,000 minutes of composer Jem Finer's Longplayer. This conversation format was borrowed from a Longplayer event originally done in London with Art Angel.

Below are the links to the conversations and a little bit of information about each of them:

• Stewart Brand & Jem Finer discuss the origins of Longplayer and how Finer connected with Long Now before the year 02000.
• Jem Finer & Saul Griffith discuss invention, modeling systems and energy of the future.
• Saul Griffith & Emily Levine discuss socks, polling, sex with people they dislike, and science in general
• Emily Levine & Jill Tarter discuss the search for extra terrestrial intelligence and how great it is to be a scientist.
• Jill Tarter & Robin Sloan discuss Fermi equations, modeling star systems and scientific literacy.
• Robin Sloan & Violet Blue discuss media invention, Twitter,

transformation of porn, and the future of journalism.
• Violet Blue & John Perry Barlow discuss techno-utopia, censorship, religion, slander, the difficulty of being sex positive, and answer the question: What is truth?
• John Perry Barlow & Ken Wilson discuss getting more Africa into the internet, why Europeans are boring, diversity, identity, and building a self organizing government.
• Ken Wilson & Melissa Alexander discuss the relationship of art and science, citizen scientists, and how to study landscape level environments.
• Melissa Alexander & Ken Foster discuss the origins of scientific education in the US, maker culture, and artistic traditions around the world.
• Ken Foster & Pete Worden discuss why NASA is not a waste of money, Saudi astronauts, and the singularity.
• Pete Worden & Peter Schwartz discuss Mars and the new 100 Year Starship program.
• Peter Schwartz & Danese Cooper discuss global economy, networks, and the future of Wikipedia.
• Danese Cooper & Stuart Candy discuss paper encyclopedias, Long Now, gifts to the future, and how to build Wikipedia in the developing world.
• Stuart Candy & Katherine Fulton discuss creating new futures, scenario planning, and how people discount the future.
• Katherine Fulton & Paul Hawken discuss global fear, transforming community, and the evolution of journalism.
• Paul Hawken & Tiffany Shlain discuss new tools of social revolution, delusions in global arguments, and systems thinking.
• Tiffany Shlain & Jane McGonigal discuss connectedness, space flights to the sun, and "gamefullness."
• Jane McGonigal & Stewart Brand discuss the origins of New Games, getting more people to design games, and a worldwide 1000 year game.

Lera Boroditsky

How Language Shapes Thought

October 26, 02010 http://longnow.org/seminars/02010/oct/26/how-language-shapes-thought/

Summary

Written by Stewart Brand

Languages are Parallel Universes

"To have a second language is to have a second soul," said Charlemagne around 800 AD. "Each language has its own cognitive toolkit," said psychologist/linguist Lera Boroditsky in 2010 AD.

Different languages handle verbs, distinctions, gender, time, space, metaphor, and agency differently, and those differences, her research shows, make people think and act differently.

Take a sentence such as "Sarah Palin read Chomsky's latest book." In Russian, the verb would have to indicate whether the whole book was read or not. In Turkish the verb would signify whether the speaker saw the event personally, or it was reported, or it was inferred. Russians have two words for blue, and when those words are present in their mind, they can distinguish finer gradations of the color than English speakers can.

Gender runs deep in some languages, affecting nouns (including number words and days of the week), adjective endings, pronouns and possessives, and verb endings. And that affects how people think about every named thing. In German the Sun is female and the Moon male; it's the reverse in Spanish. In French, "liberty" and "justice" are each female, and thus the Statue of Liberty is a female, and so is the blindfolded lady of justice in American courtrooms.

"'Time' is the most common noun in the English language," said Boroditsky. (Followed by "person," "year," "way," and "day.") Time is often expressed as travel in space: "We're coming up on Christmas." But some languages put the future in front of us, and others put it behind us. For Aborigines that Boroditsky studied in north Australia, time and

sequence gets blended into their profound orientation to the cardinal directions. They don't use relative terms like "left" and "right," but absolute compass terms ("There's an ant on your southwest leg"), and they have extraordinary orientation skills.

When Boroditsky asked these aborigines to place a sequence of photos (a progressively eaten apple) in sequential order, they did not do it like English speakers (left to right) or Hebrew and Arabic speakers (right to left), they did it by the compass: from east to west. "These are not differences of degree," said Boroditsky, "but a parallel universe."

Different languages assign blame (agency) differently. English is uncommonly agentive, and so Dick Cheney had difficulty distancing himself from the fact that he shot his friend in a hunting accident: "Ultimately I'm the guy who pulled the trigger that fired the shot that hit Harry." In Spanish, accidents are expressed in terms such as "The vase broke" rather than "John broke the vase." Political distancing language such as "Mistakes were made" doesn't sound awkward in Spanish. Fate looms larger.

Thus, "learning new languages can change the way you think," said Boroditsky. Multilingual speakers have more mind.

Rachel Sussman

The World's Oldest Living Organisms

November 15, 02010 http://longnow.org/seminars/02010/nov/15/worlds-oldest-living-organisms/

Summary

Written by Stewart Brand

The Missing Science of Biological Longevity

Creative photographer Sussman showed beautiful slides of very elderly organisms. The captions were as crucial as the images---naming the species, the place, and the approximate age. You can see many of them here: http://rachelsussman.com/portfolios/OLTW/main.html

The series began with the only animal---an eighteen-foot brain coral in the waters of Tobago, thought to be 2,000 years old. An enormous baobob in South Africa might be 2,000 years old. Then there is the astounding welwitschia mirabilis of the Namibian desert, a conifer that feeds on mist, with the longest leaves in the plant kingdom. After 2,000 years it looks like this:

Of course there was a redwood in our Sequoia National Park dated precisely to 2,150 years in age. On a remote Japan island, a two-day hike was needed to track down a gorgeous cedar somewhere between 2,000 and 7,000 years old. In Perthshire, Scotland, a churchyard was long ago build around huge yew tree that now is between 2,000 and 5,000 years old. In Chile the Patagonian cypress gets up to 2,200 years old, and a chestnut tree on the island of Sicily has been there for 3,000 years. On Crete there's an olive tree that might be the oldest in the world---3,000 years. It still bears olives. It may well have been preserved because its hollow trunk served for generations as a chicken coop.

Lichen in Greenland grows 1 centimeter every 100 years. So a large specimen could be dated to 3,000 years. In the Atacama Desert at 15,000 feet in Chile, a shrub called La Llareta grows only 1.5 centimeters a year and is so dense you can stand on its leaf structure. They get to 3,000 years old. The bristlecone pines much beloved at Long Now have been dated up to 5,000 years old.

Send in the clones. Cloned forests are basically one individual that sends up a multitude of stems from a single extensive, very long-lived root system. Sussman found a clonal forest of spruce in Sweden that is 9,550 years old; box huckleberry in Pennsylvania 13,000 years old; aspens in Utah 80,000 years old; and clonal sea grass off of Spain that is 100,000 years old.

So far the age champion is an actinobacteria that lives in Siberian permafrost---alive for 400 to 600,000 years---half a million years.

Sussman found all these creatures with the guidance of remarkable field biologists who have never met each other, because biological longevity is not yet a science. Artist Sussman is startled to be its first practitioner. She has two more years to go on this project. Long Now would love to see a conference mustered at the end of her project to bring together all the scientists she's gotten to know, to see what aggregating their knowledge

might conjure up. If sponsors are interested, Long Now would be glad to organize the event.

Thanks to Tom Lowe for the use of his short film Timescapes

Rick Prelinger

Lost Landscapes of San Francisco, 5

December 16, 02010 http://longnow.org/seminars/02010/dec/16/lost-landscapes-san-francisco-5/

Summary

Written by Stewart Brand

Lives of San Francisco

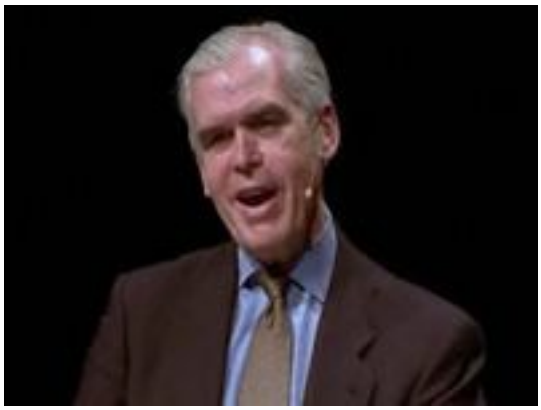
"You are the soundtrack," Prelinger told the capacity audience at the Herbst Theater, and they responded to his mostly silent archival films by calling out locations, questions, comments, and jokes.

They saw footage of a 1941 Market Street parade of allies---floats representing Malta, Russia, France, Britain---and Kezar Stadium hosting a ferocious mock battle/demonstration of Army cannon, troops, and tanks in 1942 and huge naval ships parked at the waterfront piers in 1945.

Sailors cruised the Barbary Coast in 1914 and amateurs piloted gliders from the vast beach dunes of the Sunset district in 1918 (looking just like the hang-gliders of 90 years later). There was a sky tram at the Cliff House and four sets of streetcar tracks busy on Market Street. Impromptu hula dancers drew a crowd on Market in one decade, and flower stands adorned it in another. Artists filled the Montgomery Building.

All of Treasure Island could be seen burning, and no one present could remember when it was or what caused it or what happened afterward.

"Fictional narratives push out actual narratives," Prelinger said. We remember stories, and what isn't in them, we forget. It takes large archives like his, diligently collected and made public, to free us from selective memory. Constantly reunderstanding the past goes best when grounded in the true strangeness of what used to go on.



Philip K. Howard

Fixing Broken Government

January 18, 02011 http://longnow.org/seminars/02011/jan/18/fixing-broken-government/

Summary

Written by Stewart Brand

Government 4.0

Americans have made major adjustments to our government before, Howard declared. At the beginning of the 20th century a Progressive era ended strict laissez-faire. The New Deal in the 1930s provided social safety nets. In the 1960s Civil Rights came to the fore. Now we need a fourth big change, because our government has managed to paralyze itself with the accretion of decades of excessively detailed laws.

In the Eisenhower era the entire Interstate Highway system was installed in about 15 years. That couldn't happen now. Getting permission to build one offshore wind farm near Cape Cod took a decade while 17 agencies studied it, and 18 lawsuits now pending will delay the project another decade. The Interstate Highway Act was 29 pages long. Our new Health Care bill is 2,700 pages.

The news laws obsess over methods instead of focussing primarily on goals and responsible institutions. They disable the power of office holders to decide and act because they try to prevent bad choices, and thus they disable the power to make good choices. Liberals want to head off game-playing corporations, and conservatives want to keep government officials from having too much power. The result is broken government and a citizenry maddened by a system that defies common sense.

Only real people make things happen, Howard said, not laws alone. We need a framework that enables real people to take responsibility, to have the authority to say "Do it," to say "You're fired," to be accountable and to require accountability.

To get there, Howard proposes three modifications of our government's operating system.

One, a spring cleaning of all budgetary law. Three-quarters of most budgets are now locked in, so present decision makers have no flexibility and they wind up taking money from schools and parks. We need to create an omnibus sunset law, so all budgetary laws have a requirement to be discarded or revised every ten or fifteen years.

Two, laws have to be radically simplified. They must be understandable and revisable. They have to enable the people executing the laws to use their judgement. That means focussing primarily on goals.

Three, public employees have to be accountable. Which means: if they fail to perform, they can lose their job. Under the present system government worker unions have captured the apparatus that employs them and made much of it work primarily for them rather than primarily for the public.

The system will not fix itself. It is up to the public---us---to mobilize and demand this kind of overhaul, to find leaders who will demand it, and support them.

Mary Catherine Bateson

Live Longer, Think Longer

February 9, 02011 http://longnow.org/seminars/02011/feb/09/live-longer-think-longer/

Summary

Written by Stewart Brand

Parenting Earth

The birth of a first child is the most intense disruption that most adults experience. Suddenly the new parents have no sleep, no social life, no sex, and they have to keep up with a child that changes from week to week. "Two ignorant adults learn from the newborn how to be decent parents." Everything now has to be planned ahead, and the realization sinks in that it will go on that way for twenty years.

More than with any other animal, human childhood dependency is enormously prolonged. That's a burden on parents and the species, but that long childhood is what makes us so adaptive, so capable of hope and love, so able to think ahead. It makes us the time-binding species.

Lately there's been a new development in the human lifecycle---extended adulthood. In the twentieth century human lifespan got thirty years longer. "Increased longevity," Bateson proposed, "may make a difference for the human species as momentous as our long dependent childhood." A whole new stage of life has emerged---what Bateson calls Adulthood II.

In the old days a child would be lucky to have one living grandparent. These days kids have seven or eight grandparents of various sorts, and their laps are not available because the oldsters have gone back to school, or eloped with somebody, or started new careers, or are off cruising the world.

They say, "I don't feel 60!" That's because they internalized stereotypes of "60" that no longer apply. A lot of cultural baggage about age now has to be thrown out, just as with previous liberation movements---civil rights, women's rights, gay rights. With each new equality comes new

participation. Women who fought for the right to work, for example, get insulted afresh by the idea of mandatory retirement.

So our elders will be active, but will they be wise? It's not a given. "Experience is the best teacher only if you do your homework, which is reflection," Bateson said. Adulthood II offers most people the time to reflect for the first time in their lives. That reflection, and the actions that are taken based on it, is the payoff for humanity of extended adulthood.

Herself reflecting on parenthood, Bateson proposed that the metaphor of "mother Earth" is no longer accurate or helpful. Human impact on nature is now so complete and irreversible that we're better off thinking of the planet as if it were our first child. It will be here after us. Its future is unknown and uncontrollable. We are forced to plan ahead for it. Our first obligation is to keep it from harm. We are learning from it how to be decent parents.

Matt Ridley

Deep Optimism

March 22, 02011 http://longnow.org/seminars/02011/mar/22/deep-optimism/

Summary

Written by Stewart Brand

Undeniable Progress

Hominids had upright walking, stone tools, fire, even language but still remained in profound stasis. What led to humanity's global takeoff, Ridley argues, was the invention of exchange about 120,000 years ago. "That's ten times older than agriculture."

The beginnings of trade encouraged specialization and innovation, which encouraged further innovation, specialization, and trade, and the unending virtuous cycle of progress was set in motion. The quality and speed of the progress depends on the size of the population doing the exchanging. "It's not how clever we are but how much in contact we are with each other." Thus the 5,000 Australians who became isolated on Tasmania 10,000 years ago didn't just stop progressing, they forgot how to make and use bone tools and even how to clothe themselves against cold weather. Their individual brains were fine, "but there was something wrong with their collective brains."

What really is being exchanged is ideas. The Pill-cam (for shooting video of your gut) was invented, Ridley points out, when a gastroenterologist had a conversation with guided missile designer.

The acceleration of progress can be measured in objective terms such as the amount of labor it takes to earn an hour of reading light. In 1997, with CF bulbs, it was half a second. In 1950, with incandescent bulbs, eight seconds. In 1880, with kerosene lamps, fifteen minutes. In 1800, with candles, six hours. In every decade various intellectuals keep saying that progress has stopped or is about to stop, but Ridley showed chart after chart chronicling constant improvement in everything we care about. Life expectancy is increasing by five hours a day. IQ keeps going up by three

points a decade. Agriculture gets ever more productive, leaving more land to remain wild. Even economic inequality is decreasing, with poor countries getting rich faster than rich countries are getting richer.

On the subject of climate change, Ridley has a similar set of detailed charts showing that sea level has been rising slowly for a long time, but it is not accelerating. The same with the retreat of glaciers. Overall global warming is proceeding slower than was predicted. Humanity has been decarbonizing its energy supply steadily for 150 years as we progressed from wood to coal to oil to natural gas. A few years ago it was thought that only 25 years of natural gas was left, but with the invention of hydrofracking shale gas, the supply is suddenly 250 years worth, and it is a hugely cleaner source than coal. (Among nuclear innovations, Ridley is particularly intrigued by thorium reactors.)

"The story of history is of more for less." Paul Ehrlich's formula (I=PAT--- environmental Impact equals Population times Affluence times Technology) is better stated as I=P/AT--- Impact equals Population divided by Affluence times Technology. As affluence and technology increase, and population levels off, environmental impact can go ever down.

An historian once wrote, 'On what principle is it that when we see nothing but improvement behind us, we are to expect nothing but deterioration before us?" That was English historian Thomas Babington Macaulay in 1830, before the industrial revolution had really had much effect on living standards.

Ian Morris

Why the West Rules - For Now

April 13, 02011 http://longnow.org/seminars/02011/apr/13/why-west-rules-now/

Summary

Written by Stewart Brand

Geographical determinism

Historians and others who try to explain the world dominance by the West since the 18th century usually put it down to long-term lock-in or short-term accidents, said Morris. The lock-in theories are belied by the dominance of the East from 550 to 1750 CE. The accidents approach is undermined by clear patterns that emerge when you look for them in a rigorous way.

Morris has devised a quantitative "social development index" based on evaluating a civilization's energy capture, organization (size of largest cities), information management, and war-making capability. (The details of his method are online here.) When you graph human progress since the last ice age 15,000 years ago, the results show that the West led for all the millennia up till the 6th century CE, fell behind for 1,200 years, then leapt ahead again up to the present day. (The "West" for Morris is the civilizational core that developed agriculture and then cities and empires in the eastern Mediterranean, later spreading across Europe and North America. The "East" is China.)

Geography determines how and when regions develop, but new societal capabilities keep redefining what geography means. At first agriculture was limited to regions with reliable rainfall, but once societies grew able to manage large-scale irrigation, the empires of parched regions like Mesopotamia and Egypt could take off, and their rivers became trade routes. The vast steppes of north-central Asia long separated Western and Eastern empires, but once their riches became worth plundering, mounted nomads from the steppes invaded repeatedly, defeating the agrarian armies and carrying germs that unleashed waves of epidemics.

The West had the advantage of a trade highway in the Mediterranean that wasn't matched in the East until the 6th century, when the Sui emperors built the Grand Canal 1,500 miles long linking north and south China. Everything then changed with the invention of ocean-going ships and guns in the 13th and 14th centuries. (The gun innovation took only 40 years to spread from China to Europe.) Suddenly the most important geographic fact was the differing sizes of the Atlantic and Pacific oceans. Europeans had only 3,000 miles to travel to conquer the Americas; the Chinese (who had capable ships) faced a 6,000 mile barrier. Atlantic trade gave Europe the wealth and science to start the industrial revolution, and with that the West unleashed a global economy, within which players in the East are now flourishing rapidly.

Extending the story to the rest of this century, Morris says that if present trends merely continue, the East will retake leadership by the end of the century. But the accelerating pace of social development may make geography irrelevant. By his index, societies have risen to an index value of 900 during the past fifteen millennia. They are likely to be at a level of 5,000 by century's end, meaning there will be five times as much progress (or catastrophe) in this 100 years as in the past 15,000 years.

Books about the future, Morris noted, nearly always portray the future as much like the present. "That," he said, "won't happen."

Ian Morris is the author of *Why the West Rules - For Now*.

Tim Flannery

Here on Earth

May 3, 02011 http://longnow.org/seminars/02011/may/03/here-earth/

Summary

Written by Stewart Brand

Wallace beats Darwin

The great insight of natural selection was published simultaneously by Charles Darwin and Alfred Russell Wallace in 1858, Flannery pointed out, but their interpretations of the insight then diverged. Darwin's harsh view of "survival of the fittest" led too easily to social Darwinism, eugenics societies, neo-classical economics, and an overly reductionist focus on the "selfish gene." Wallace, by contrast, focussed on the tendency of evolution to generate a world of complex co-dependence, and he became an activist for social justice.

At the age of 80 in 1904 Wallace published a book titled *Man's Place in the Universe*, which proposed that Earth was the only living planet in the Solar System. Flannery regards it as "the foundation text of astrobiology" and, with its view that the atmosphere is an instrument of life, a direct precursor of James Lovelock's Gaia Hypothesis and Earth System Science. The study of Earth systems, in turn, revealed that the atmosphere is 99 percent an artifact of life (minus only the noble gases), that the makeup of the oceans is life-driven (toxic heavy metals were concentrated into ore bodies), and that the whole, in Flannery's terms, constitutes a "commonwealth of virtue," using "geo-pheromones" such ozone, methane, atmospheric dust, and dimethyl sulfide from algae to regulate the stability of a livable planet. It acts like a loosely connected superorganism.

The first tightly connected superorganism came 100 million years ago when cockroaches invented agriculture and the division of labor and became termites, building complex skyscrapers with air-conditioning, highways, and garbage dumps. Only 10,000 years ago, humans did the same, inventing agriculture and the division of labor in cities, becoming

the most potent superorganism yet. One cause of that, Flannery opined, may be our astonishing genetic uniformity, caused by a near-extinction 70,000 years ago, when only 1,000 to 10,000 breeding pairs of humans survived. The 7 billion of us now alive have less genetic diversity than any random sample of 50 chimpanzees in West Africa.

Flannery finds cause for hope in the increasing pace of global agreements to manage the global commons. There was the Comprehensive Test Ban Treaty in 1996, the Stockholm Convention on Persistent Organic Pollutants in 2001, and worthy of an annual holiday on September 16, the 1987 signing of the Montreal Protocol on Substances that Deplete the Ozone Layer. Flannery, who now works full time on climate issues, even takes hope from the last-minute Copenhagen Accord that emerged from the UN climate meeting in 2009, because it brought developing nations into the global project to reduce greenhouse gases.

In Flannery's view, Gaia is an infant still. Even if it is the only Gaian planet in the galaxy, with growing skills and rudimentary space travel, it could invest the whole galaxy with life in just 5 to 50 million years---an instant in light of Earth's 4.5 billion years and the universe's 14 billion years.

Tim Flannery is the author of *Here on Earth: A Natural History of the Planet*.

Carl Zimmer

Viral Time

June 7, 02011 http://longnow.org/seminars/02011/jun/07/viral-time/

Summary

Written by Stewart Brand

What's time to a virus?

"Everything about viruses is extreme," Zimmer began. The number of viruses on Earth is estimated to be 1 followed by 31 zeroes. Small as they are, if you stacked them all up, the stack would reach 100 million light years. They are the planet's most abundant organism by far.

They're fast. We take decades to reproduce. A flu virus can generate billions of itself in us within hours. And they evolve 10,000 times faster than us, because they're creatively sloppy about making copies of their genomes, and they readily combine genes among varieties when jointly infecting a cell. Each of us has four trillion viruses on board, in 1,500 all-too-fungible varieties.

Yet they can also be "time stealthy." You may have a bout of childhood chickenpox that is over in days, but the viruses may hide in your nervous system and emerge decades later as shingles. HIV spreads inexorably because of the lag of months or years between infection and visible symptoms.

The earliest record of a virus in human history is the smallpox marks you can see on the mummified face of Ramses V, who died in 1145 BCE. Viruses leave no fossils, but in a sense they ARE fossils, with the ancient gene sequences of retroviruses buried in the genomes of every creature they've infected over the ages. About 8 percent of our genome---some 100,000 elements---comes from viruses, and some of those genes now work for us (enabling the mammalian placenta, for instance). One French scientist revived from our genome a functioning 2-million-year-extinct virus just by deducing the original code from the current variety in that stretch of DNA.

For billions of years the planet's life consisted solely of bacteria and their viruses, the bacteriophages. They became a planet force, and remain so today, determining the makeup of the atmosphere, among other things. Every day half of all the bacteria in the oceans are killed by phages. Some of the carbon from the bodies sinks to the bottom, some is freed up to fertilize other life. Ocean viruses cart around and transmit genes for photosynthesis to previously incapable microbes---10 percent of oceanic photosynthesis happens that way. If some day we have to geoengineer the atmosphere to manage climate change, we may want to employ the viruses that are already doing it.

Virology will be revolutionizing science for decades to come. One body of investigation suggests that the so-called giant viruses may be a whole fourth domain of life (added to bacteria, archaea, and eukaryotes). As the ultimate parasite, viruses were assumed to come along after life evolved, but they might an instrument of that evolution. One hypothesis is that viruses took primordial RNA and generated DNA to better protect the genes. They might have created life as we know it, a long time ago.

Peter Kareiva

Conservation in the Real World

June 27, 02011 http://longnow.org/seminars/02011/jun/27/conservation-real-world/

Summary

Written by Stewart Brand

Environmentalism for THIS Century

Kareiva began by recalling the environmental "golden decade" of 1965-75, set in motion by the scientist Rachel Carson. In quick succession Congress created the Clean Air Act, the Clean Water Act, and the Endangered Species Act---which passed the Senate unanimously.

Green influence has been dwindling ever since. A series of polls in the US asked how many agreed with the statement, "Most environmentalists are extremists, not reasonable people." In 1996, 32% agreed. In 2004, 43% agreed. Now it's over 50% who think environmentalists are unreasonable.

Kareiva noted that as the world is urbanizing, ever fewer people grow up in contact with nature---current college freshman have less than a tenth of the childhood experience of nature as previous generations. And there's a demographic shift toward multiethnicity, with whites already a minority in California and soon to be a minority in the whole country. Asked to describe a typical environmentalist, current grade school students say it's a girl, white, with money, preachy about recycling, nice but uptight, not sought as a friend.

In general, environmentalist have earned the reputation of being "misanthropic, anti-technology, anti-growth, dogmatic, purist, zealous, exclusive pastoralists."

Kareiva gave several examples of how that reputation was earned. In Green rhetoric, everything in nature is described as "fragile!"---rivers, forests, the whole planet. It's manifestly untrue. America's eastern forest lost two of its most dominant species---the American chestnut and the

passenger pigeon---and never faltered. Bikini Atoll was vaporized in an H-bomb test that boiled the ocean. When National Geographic sent a research team there recently, they found 25% more coral than was ever there before. The Deepwater Horizon oil disaster last year caused dramatically less harm to salt marshes and fisheries than expected, apparently because ocean bacteria ate most of the 5 million barrels of oil.

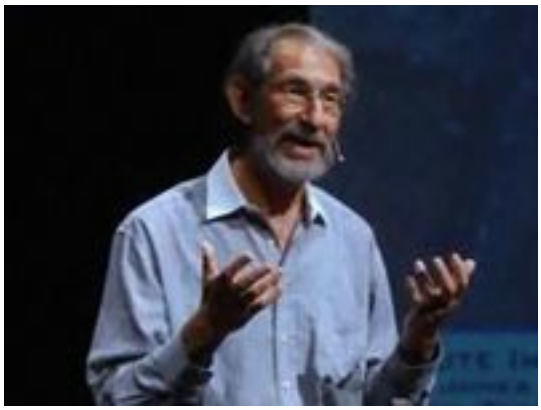
The problem with the fragility illusion is that it encourages a misplaced purism, leaving no room for compromise or negotiation, and it leads to "fortress conservation"---the idea that the only way to protect "fragile" ecosystems is to exclude all people. In Uganda, when a national park was established to protect biodiversity, 5,000 families were forced out of the area. After a change in government, those families returned in anger. To make sure they were never forced out again, they slaughtered all the local wildlife. In the 1980s, Kareiva was a witness in Seattle for protecting old growth forest (and spotted owls). At the courtroom loggers carried signs reading: "You care about owls more than my children." That jarred him.

When genetically engineered crops (GMOs) came along, environmentalists responded with "knee-jerk anti-technology religiosity," Kareiva said. How to feed the world was not a consideration. Lessening the overwhelming impact of agriculture on natural systems was not a consideration. Instead, the usual apocalyptic fears were deployed in the usual terms: EVERYTHING'S GOING TO BE DEAD TOMORROW! When Kareiva was working on protecting salmon, he saw the same kind of language employed in a 1999 New York Times full-page ad about dams in the Snake River: TIMELINE TO EXTINCTION! He knew it wasn't true. Salmon are a weedy species, and the re-engineered dams were letting the fish through.

The Nature Conservancy---where Kareiva is chief scientist working with the organization's 600 scientists, 4,000 staff, and one million members in 37 countries---promotes a realistic approach to conservation. Instead of demonizing corporations, they collaborate actively with them. They've

decided to do the same with farmers, starting an agriculture initiative within the Conservancy. For the growing cities they emphasize the economic value of conservation in terms of valuable clean water and air. They started a program taking inner-city kids out to their field conservation projects not to play but to work on research and restoration. An astonishing 30% of those kids go on to major in science.

Kareiva sees conservation in this century as a profoundly social, cooperative undertaking that has to include everyone. New social networking tools can be in the thick of it. For instance, people could use their smartphones to photograph (and geotag, timestamp, and broadcast) the northernmost occurrence of bird species, and the aggregate data could be graphed in real time, showing the increasing effects of global warming on the natural world. When everyone makes science like that, everyone owns it. They've invested.



Geoffrey B. West

Why Cities Keep on Growing, Corporations Always Die, and Life Gets Faster

July 25, 02011 http://longnow.org/seminars/02011/jul/25/why-cities-keep-growing-corporations-always-die-and-life-gets-faster/

Summary

Written by Stewart Brand

Superlinear Cities

"It's hard to kill a city," West began, "but easy to kill a company." The mean life of companies is 10 years. Cities routinely survive even nuclear bombs. And "cities are the crucible of civilization." They are the major source of innovation and wealth creation. Currently they are growing exponentially. "Every week from now until 2050, one million new people are being added to our cities."

"We need," West said, "a grand unified theory of sustainability--- a coarse-grained quantitative, predictive theory of cities."

Such a theory already exists in biology, and you can build on that. Working with macroecologist James Brown and others, West explored the fact that living systems such as individual organisms show a shocking consistency of scalability. (The theory they elucidated has long been known in biology as Kleiber's Law.) Animals, for example, range in size over ten orders of magnitude from a shrew to a blue whale. If you plot their metabolic rate against their mass on a log-log graph, you get an absolutely straight line. From mouse to human to elephant, each increase in size requires a proportional increase in energy to maintain it.

But the proportion is not linear. Quadrupling in size does not require a quadrupling in energy use. Only a tripling in energy use is needed. It's sublinear; the ratio is 3/4 instead of 4/4. Humans enjoy an economy of scale over mice, as elephants do over us.

With each increase in animal size there is a slowing of the pace of life. A shrew's heart beats 1,000 times a minute, a human's 70 times, and an elephant heart beats only 28 times a minute. The lifespans are

proportional; shrew life is intense but brief, elephant life long and contemplative. Each animal, independent of size, gets about a billion heartbeats per life. (West added that human bodies run on 100 watts---2,000 calories of food a day. But our civilizational energy use adds up 11,000 watts per person. We're like blue whales walking around.)

Does such scalability apply to cities? If you plot, say, the number of gas stations against the size of population of metropolitan areas on a log-log scale, it turns out you get another straight line. Ditto with the length of electrical lines, carbon footprint, etc. Per capita, big city dwellers use less energy than small town dwellers. As with animals, there is greater efficiency with size, this time at a 9/10 ratio. Energy use is sublinear.

But unlike animals, cities do not slow down as they get bigger. They speed up with size! The bigger the city, the faster people walk and the faster they innovate. All the productivity-related numbers increase with size---wages, patents, colleges, crimes, AIDS cases---and their ratio is superlinear. It's 1.15/1. With each increase in size, cities get a value-added of 15 percent. Agglomerating people, evidently, increases their efficiency and productivity.

Does that go on forever? Cities create problems as they grow, but they create solutions to those problems even faster, so their growth and potential lifespan is in theory unbounded.

(West pointed out that there is a bit of variability between cities worth noticing. On the plot of crimes/population, Tokyo has slightly fewer crimes for its size, and Osaka has slightly more. In the U.S., the most patents per capita come from Corvalis, Oregon, and the least from Abiline, Texas. Such variations tend to remain constant over decades, despite everyone's efforts to adjust them. "Exciting cities stay exciting, and boring cities stay boring.")

Are corporations more like animals or more like cities? They want to be

like cities, with ever increasing productivity as they grow and potentially unbounded lifespans. Unfortunately, West et al.'s research on 22,000 companies shows that as they increase in size from 100 to 1,000,000 employees, their net income and assets (and 23 other metrics) per person increase only at a 4/5 ratio. Like animals and cities they do grow more efficient with size, but unlike cities, their innovation cannot keep pace as their systems gradually decay, requiring ever more costly repair until a fluctuation sinks them. Like animals, companies are sublinear and doomed to die.

What is the actual mechanism of difference? Research on that continues. "Cities tolerate crazy people," West observed, "Companies don't."

Timothy Ferriss

Accelerated Learning in Accelerated Times

September 14, 02011
http://longnow.org/seminars/02011/sep/14/accelerated-learning-accelerated-times/

Summary

Written by Stewart Brand

Learning to learn fast

To acquire "the meta-skill of acquiring skills," Ferriss recommends approaching any subject with some contrarian analysis: "What if I try the opposite of best practices?" Some conventional wisdom---"children learn languages faster than adults" (no they don't)---can be discarded. Some conventional techniques can be accelerated radically. For instance, don't study Italian in class for a year before your big Italy trip; just book your flight a week early and spend that week cramming the language where it's spoken. You can be fluent in any language with mastery of just 1,200 words.

That's what Ferriss calls the "minimum effective dose" for learning a language. The equivalent with any skill or goal is worth identifying. A regular 5 minutes of kettlebell swinging can tone the body rapidly; 30 grams of protein within 30 minutes of waking makes your slow-carb diet effective; just 20,000 "early evangelists" for your book in its first 2 weeks guarantees it becomes a best seller.

With any skill, "solve for extremes and anomalies." Look at who's best and how they do it, but especially look for those who are surprisingly good---the wispy girl who can deadlift 405 pounds---because they're doing it with technique rather than genes, and technique is learnable.

How do you manage the self-discipline to bear down on learning a skill? Ferriss suggests you begin by treating your new regime as a trial (vowing permanence can be discouraging)--- give it 2 weeks or 5 serious sessions. By that point early rewards from the discipline will keep you going. You have to measure to detect the rewards ("What gets measured gets managed"--Peter Drucker), and score-keeping lets you make your

progress a competitive game with others---which becomes its own motivation. Make public bets about your specific goals, where you'll pay painfully if you fail. "Loss aversion" is a surprisingly powerful incentive.

You can get profound effects in an amazingly short time, Ferriss concluded. "Doing the unthinkable is easier than you think."

PS: A collection of all of these summaries of the SALT talks is available on the Kindle for $3. Foreword by Brian Eno.

Laura Cunningham

Ten Millennia of California Ecology

October 17, 02011 http://longnow.org/seminars/02011/oct/17/ten-millennia-california-ecology/

Summary

Written by Stewart Brand

Eco-continuity in California

California ecology used to be much more driven by floods and fires, Cunningham said, showing with her paintings how the Great Valley would become a vast inland sea, like a huge vernal pool progressing each year from navigable water to intense flower displays to elk-grazed grassland. Lake Merritt in Oakland was a salt water inlet. On the Albany mudflats grizzly bears would tunnel into a beached humpback whale for food, joined by California condors. Every fall at the Carquinez Strait a million four-foot-long Chinook salmon headed inland to spawn.

Only 300 years ago the whole Bay Area was grasslands, routinely burned by the local Indians. There were oaks in the valleys, redwoods in the Berkeley Hills, and extensive oak savannahs inland. The hills were greener more of the year than now, with fire-freshened grass attracting elk, and native perennial grasses drawing moisture with their deep roots.

Cunningham researched the ancient landscapes using old maps, photos, paintings, scientific reports, sundry local experts, and 30 years of fieldwork. She witnessed the last wild condors feeding on a calf carcass, chasing off a golden eagle. (The condors are now back in the wild, spotted as far north as Mt. Hamilton.) To learn about the behavior and ecological effects of wolves and grizzly bears, she studied them in Yellowstone Park. (The California golden bear was enormous, up to 2,200 pounds.)

Along the Pacific shore there used to be 10-ton Steller's sea cows (extinct in 1768), a giant petrel with an 8-foot wingspan, and a flightless diving goose that ate mussels. Further back, in the Ice Ages before 12,000 years ago, the ocean was lower, and San Francisco Bay was a savannah

occupied by huge bison (6 feet at the shoulder), a native full-sized horse similar to the African quagga (Cunningham shows it with quagga-like stripes), Columbian mammoths, and the giant short-faced bear (10 feet tall standing up).

For current Californians Cunningham encourages local restoration of old ecosystems, perhaps learning to live with more flood and fire. With her multi-millennial perspective, she's pretty relaxed about climate change. As much as long-term ecology is about continuity, it is about change.

Brewster Kahle

Universal Access to All Knowledge

November 30, 02011
http://longnow.org/seminars/02011/nov/30/universal-access-all-knowledge/

Summary

Written by Stewart Brand

All knowledge, to all people, for all time, for free

Universal access to all knowledge, Kahle declared, will be one of humanity's greatest achievements. We are already well on the way. "We're building the Library of Alexandria, version 2. We can one-up the Greeks!"

Start with what the ancient library had---books. The Internet Library already has 3 million books digitized. With its Scribe Book Scanner robots---29 of them around the world---they're churning out a thousand books a day digitized into every handy ebook format, including robot-audio for the blind and dyslexic. Even modern heavily copyrighted books are being made available for free as lending-library ebooks you can borrow from physical libraries---100,000 such books so far. (Kahle announced that every citizen of California is now eligible to borrow online from the Oakland Library's "ePort.")

As for music, Kahle noted that the 2-3 million records ever made are intensely litigated, so the Internet Archive offered music makers free unlimited storage of their works forever, and the music poured in. The Archive audio collection has 100,000 concerts so far (including all the Grateful Dead) and a million recordings, with three new bands every day uploading.

Moving images. The 150,000 commercial movies ever made are tightly controlled, but 2 million other films are readily available and fascinating---600,000 of them are accessible in the Archive already. In the year 2000, without asking anyone's permission, the Internet Archive started recording 20 channels of TV all day, every day. When 9/11 happened, they were able to assemble an online archive of TV news coverage all

that week from around the world ("TV comes with a point of view!") and make it available just a month after the event on Oct. 11, 2001.

The Web itself. When the Internet Archive began in 1996, there were just 30 million web pages. Now the Wayback Machine copies every page of every website every two months and makes them time-searchable from its 6-petabyte database of 150 billion pages. It has 500,000 users a day making 6,000 queries a second.

"What is the Library of Alexandria most famous for?" Kahle asked. "For burning! It's all gone!" To maintain digital archives, they have to be used and loved, with every byte migrated forward into new media every five years. For backup, the whole Internet Archive is mirrored at the new Bibliotheca Alexandrina in Egypt and in Amsterdam. ("So our earthquake zone archive is backed up in the turbulent Mideast and a flood zone. I won't sleep well until there are five or six backup sites.")

Speaking of institutional longevity, Kahle noted during the Q & A that nonprofits demonstrably live much longer than businesses. It might be it's because they have softer edges, he surmised, or that they're free of the grow-or-die demands of commercial competition. Whatever the cause, they are proliferating.

Lawrence Lessig

How Money Corrupts Congress and a Plan to Stop It

January 17, 02012 http://longnow.org/seminars/02012/jan/17/how-money-corrupts-congress-and-plan-stop-it/

Summary

Written by Kevin Kelly

Public Funding for Public Elections

Larry Lessig gave a rousing performance for the 100th Seminar About Long-Term Thinking. In a lawyerly fashion he laid out evidence of a new type of corruption that is disrupting the American republic, and he offered a remedy for that corruption. Lessig has a very distinctive visual style of using slides that punctuates, word for word, the clear logic of his argument.

He said the type of corruption rampant in the US Congress is not the old type of bribery, where congressional representatives had safes in their offices to hold the cash they received for voting in certain directions. That is now illegal and eliminated. This new type of corruption is more subtle, indirect and harder to outlaw. Corporations legally donate money to the election campaigns of legislators, who in turn tend to vote in favor of the interests of those corporations. Non-profits like Maplight can graph the evidence that a representative voting in favor of a particular corporate-friendly law will receive 6 or 10 or 13 times the funding than someone who opposes the law. He cited studies that showed the ROI (return on investment) of lobbying to be 1,000%. It was one of the sanest expenses for a corporation. But the distortion is not just one sided. The issue that Congress spent the most time on in 2011 -- a year when US was waging two wars, dealing with a near economic depression, and revamping health care -- was the bank swipe fee. Who should pay the credit card use fee -- the banks or the stores? There were corporations on both sides of this minor argument, but each side was promising campaign funds, so this was the issue that got all the attention of the officials. But the real money to be made in Congress is the relative fortune to be made as a lobbyist after leaving office. The differential in wages between a staff member and a lobbyist has escalated a hundred fold in the past 40

years. Now 43% of staff go on to become lobbyists. The promise of a well-paying job working for corporate interests later is enough to warp voting now.

None of this is illegal, but Lessig argues that we have a constitutional argument for eliminating it. The Constitution talks about the republic being "dependent on the people alone." But now it is dependent on corporate funders, and more and more JUST on corporate funders. His solution is to return the republic to being dependent on the people alone. His solution is an innovative kind of campaign finance reform. Give every voter a $50 campaign voucher. The $50 comes from the tax pool. It can be given to any candidate who accepts only money from the vouchers (and maybe a limit of an optional voluntary $100 per single voter). Thus all campaign money would come in very small amounts from The People. Lessig calculates that the total amount of money raised this public way would be 3 times the amount raised by private means in the last election cycles, and therefore more than adequate. But it would break the grip of corporate influence over what is voted up. The result would not be harmonious utopia, but the usual give-and-take compromises of politics -- which the US has not seen in decades. The issues that people cared about would return to the agenda.

Lessig spent the remaining time and some of the question and answers talking about the real-politic necessary to pass this reform. A similar public financing scheme works in places like Sweden, where one elected legislator told Lessig he had never had to worry about where his funding came from. But the US has a fierce free-speech component not found elsewhere, and ironically, since spending money is viewed as a type of free speech, this complicates reform. As a free-speech advocate himself, and a constitutional lawyer, Lessig talked candidly about the difficulties of reform. He ended by saying that it would probably be a generational task. Overcoming institutional racism and sexism took more than one generation, and returning the republic to the "people alone" could take just as long, although in this case, the republic might not last that long

without reform.

Jim Richardson

Heirlooms: Saving Humanity's 10,000-year Legacy of Food

February 22, 02012
http://longnow.org/seminars/02012/feb/22/heirlooms-saving-humanitys-10000-year-legacy-food/

Summary

Written by Stewart Brand

Save Agricultural Biodiversity

Humanity's agricultural legacy is on a par with any of our great cultural legacies, Richardson said, but preserving it is not just a matter of honoring the history and richness of our most fundamental civilization-enabling technology. For the health of future crops and livestock we need the deep genetic reservoir of all those millennia of sophisticated breeding. A million people died in the Irish Potato Famine because the whole nation depended on just two varieties of potato. In Peru, where potatoes originally came from, Richardson visited a field at 14,000 feet where 400 varieties of potato (with names like "Ashes of the Soul" and "Puma Paw") are grown in just two acres. The local 1,300 varieties of potato are managed by a "Guardian of the Potatoes," whose job it is in the community to know the story and uses of all the potatoes.

The accumulated wisdom in the crops and livestock is profound. We've been breeding cattle for 10,000 years, goats for 9,000 years, dogs for 12,000 years, chickens for 8,000 years, llamas for 6,500 years, horses for 6,000 years, camels for 4,000 years. All those millennia we have been in deep partnership with the animals. All of our staple foods are ancient. Wheat has been bred for 11,000 years, corn for 8,000 years, rice for 8,000 years, potatoes for 7,000 years, soybeans for 5,000 years

"For 9,900 years," Richardson said, "we've been building up variety in domesticated crops and livestock---this whole wealth of specific solutions to specific problems. For the last 100 years we've been throwing it away." 95% is gone. In the US in 1903 there were 497 varieties of lettuce; by 1983 there were only 36 varieties. (Also changed from 1903 to 1983: sweet corn from 307 varieties to 13; peas from 408 to 25; tomatoes from 408 to 79; cabbage from 544 to 28.) Seed banks have

been one way to slow the rate of loss. The famous seed vault at Svalbard serves as backup for the some 1,300 seed banks around the world. The great limitation is that seeds don't remain viable for long. They have to be grown out every 7 to 20 years, and the new seeds returned to storage.

Even with living heirlooms, the rule is Use It Or Lose It. Devotees of exotic cattle say "You have to eat them to save them." With dramatic photos Richardson compared the livestock shows in Wales with the livestock markets in Ethiopia. You see children adoring the young animals and breeders obsessing on details of excellence and uniqueness. "One guy says, 'You see that sheep with the heart-shaped spot on his left shoulder? I'll bet you I can move it to his rump in four generations.'" There's a sheep called the North Ronaldsay that is bred to live solely on seaweed on the coast. Ethiopia has some specialists, like the Sheko cattle that are resistant to tsetse flies, but unlike in Europe, most of their breeds have to be generalists capable of providing meat, milk, labor (such pulling plows), and warmth in the winter.

Helping preserve agricultural biodiversity is open to anyone. The Seed Savers Exchange in Decorah, Iowa, has 13,000 members. Their catalog is a cornucopia of heirloom garden delights, and members learn how to produce and store their own seeds and then share them. "It's a wonderful example of citizens participating in the process." And we can always acquire a new taste for old foods. Teff! Quinoa! Amaranth! Randall Lineback cows! You have to eat them to save them.

PS: Jim Richardson's beautiful heirloom photos and article may be found here.

Mark Lynas

The Nine Planetary Boundaries: Finessing the Anthropocene

March 6, 02012 http://longnow.org/seminars/02012/mar/06/nine-planetary-boundaries-finessing-anthropocene/

Summary

Written by Stewart Brand

The Quantified Planet

“About 74,000 years ago,” Lynas began, “a volcanic event nearly wiped out humanity. We were down to just a thousand or so embattled breeding pairs. We’ve made a bit of a comeback since then. We’re over seven billion strong. In half a million years we’ve gone from prodding anthills with sticks to building a worldwide digital communications network. Well done! But... there’s a small problem. In doing this we’ve had to capture between a quarter and a third of the entire photosynthetic production of the planet. We’ve raised the temperature of the Earth system, reduced the alkalinity of the oceans, altered the chemistry of the atmosphere, changed the reflectivity of the planet, hugely affected the distribution of freshwater, and killed off many of the species that share the planet with us. Welcome to the Anthropocene, our very uniquely human geological era.”

Some of those global alterations made by humans may be approaching tipping points---thresholds---that could destabilize the whole Earth system. Drawing on a landmark paper in Nature in 2009 (“A Safe Operating Space for Humanity,” by Johan Rockström et al.) Lynas outlined the nine boundaries we should stay within, starting with three we’ve already crossed. 1. Loss of biodiversity reduces every form of ecological resilience. The boundary is 10 species going extinct per million per year. Currently we lose over 100 species per million per year. 2. Global warming is the most overwhelming boundary. Long-term stability requires 350 parts per million (ppm) of carbon dioxide in the atmosphere; we’re currently at 391 ppm and rising fast. “The entire human economy must become carbon neutral by 2050 and carbon negative thereafter.” 3. Nitrogen pollution. With the invention a century ago of the Haber-Bosch process for creating nitrogen fertilizer, we

doubled the terrestrial nitrogen cycle. We need to reduce the amount of atmospheric nitrogen we fix per year to 35 million tons; we're currently at 121 million tons.

Other quantifiable boundaries have yet to be exceeded, but we're close. 4. Land use. Every bit of natural landscape lost threatens ecosystem services like clean water and air and atmospheric carbon balance. "Already 85% of the Earth's ice-free land is fragmented or substantially affected by human activity." The danger point is 15% of land being used for row crops; we're currently at 12%. 5. Fresh water scarcity. Increasing droughts from global warming will make the problem ever worse. In the world's rivers, "the blue arteries of the living planet," there are 800,000 dams with two new large ones built every day. The numeric limit is thought to be 4,000 cubic kilometers of runoff water consumed per year; the current number is 2,600. 6. Ocean acidification from excess atmospheric carbon dioxide is increasingly lethal to ocean life such as coral reefs. The measure here is "aragonite saturation level." Before the industrial revolution it was 3.44; the limit is 2.75; we're already down to 2.90. 7. The ozone layer protects the Earth from ultraviolet radiation. One man (Thomas Midgley) invented the chlorofluorocarbon coolant that rapidly reduced stratospheric ozone, and one remarkable agreement (Montreal Protocol, 1987) cut back on CFCs and began restoring the ozone layer. (In Dobson units the limit is 276; before Midgley it was 290; we're now back up to 283.)

Two boundaries are so far unquantifiable. 8. Chemical pollution. Rachel Carson was right. Human toxics are showing up everywhere and causing harm. Coal-fired power plants are one of the worst offenders in this category. (Lynas added that nuclear waste belongs in this category but "the supposedly unsolved problem of nuclear waste hasn't so far harmed a single living thing." 9. Atmospheric aerosols---airborne dust and smoke. It kills hundreds of thousands of people annually, the soot causes ice to melt faster, and everyone wants to get rid of it. But one beneficial effect it has is cooling, so Lynas proposes "we could move this pollution

from the troposphere where people have to breathe it up to the stratosphere where it can still cool the Earth and no one has to breathe it. That's called geoengineering."

Lynas proposed that the goal for the future should be to get the whole world out of poverty by 2050 while staying within the planetary boundaries. Among the solutions he proposed are: clean cookstoves for the poor (they cause 1.6 million deaths a year); better GM crops for nitrogen efficiency and concentrated land use; integral fast reactors which run on nuclear waste (a recent calculation shows the UK could get 500 years of clean energy from its present waste, and the resulting IFR waste is a problem for 300 years, not for thousands of years); international treaties, which are crucial for dealing with global problems; carbon capture (everything from clean coal to biochar); and ongoing "dematerialization," doing ever more with ever less, including more intense farming on less land. "Peak consumption," Lynas noted, has already arrived in much of the developed world.

Edward O. Wilson

The Social Conquest of Earth

April 20, 02012 http://longnow.org/seminars/02012/apr/20/social-conquest-earth/

Summary

Written by Stewart Brand

The real creation story

“History makes no sense without prehistory,“ Wilson declared, “and prehistory makes no sense without biology.” He began by noting that every religion has a different creation story, all of them necessarily based on ignorance of what really happened in the past. Religions thus can’t give valid answers on the meaning of life---Gauguin’s questions: “Where do we come from? What are we? Where are we going?” Philosophy gave up on the questions long ago. The task was left to science, and from science a valid, shareable creation story is now emerging.

For the last 65 million years Earth has been dominated by eusocial animals. Ants, termites, and bees in some areas make up half of all biomass. Yet only a few of the million known insect species made the jump to eusociality. One variety of mammal, a tiny set of primates, made a similar jump. Once they began to use their eusocial skills to fan out from Africa 60 thousand years ago, they gradually became far more dominant even than the social insects. “The term ‘eusocial,’“ Wilson said, “means a society based in part on a division of labor, in which individuals act altruistically, that covers two or more generations, and that cares for young cooperatively.”

That eusociality is so rare suggests how difficult it is for altruistic traits to evolve. The powerful evolutionary force to make individuals that successfully reproduce has to be overcome by some form of selective pressure which generates altruistic individuals who yield their interests to the interests of the group. How does that occur? Examining near-eusocial species like African wild dogs and snapping shrimp along with primitively eusocial species like sweat bees shows that a crucial step appears to be made when multiple generations linger to defend a

constructed nest with valuable access to food. That step can be made with a simple change to a single behavioral gene, silencing the trait for normal dispersal of young to carry out their own independent reproduction. When the young linger to defend the nest and begin to provide for the next generation of young, eusociality begins.

All eusocial species appear to have arisen from multi-generational nest defense. Two million years ago our ancestors began using fire for campsites and cooking. At the same time hominid brain size began expanding dramatically. Social traits emerged that have characterized humanity ever since. We love joining groups, and we became geniuses at reading the intentions of each other, a skill we fine-tune incessantly with our enjoyment of gossip. In another distinctively human trait, like ants, we became highly adept at collaborative warfare.

Wilson had long been a proponent of William Hamilton's theory of "kin selection" as an explanation for how altruistic traits could evolve. But as a naturalist he found it did not explain phenomena that he and others were discovering in eusocial species, and he began to favor "group selection" instead---a process where the "target" of evolution was sacrificially collaborative traits, because highly cooperative groups beat poorly cooperative groups, and the "units" of evolution (genes) adjusted accordingly. It is successful groups, more than successful families, that are being selected for. In 2010 Wilson, along with mathematician Martin Nowak and Corina Tarnita formally challenged kin selection with a peer-reviewed paper in Nature. There was, as Wilson put it, "considerable blowback" from kin selection theorists and supporters.

Wilson's alternative he calls "multi-level selection," where individual selection and group selection proceed together (with kin selection a continuing bit player). In our eusocial species, that mix of traits makes us "permanently unstable, permanently conflicted" between selfish impulses and cooperative impulses. We negotiate these conflicts endlessly within ourselves and with each other. Wilson sees inherent adaptive value in that

constant negotiation. Our vibrant cultural life may be driven in part by it.

In response to a question about what the next stages of human eusociality might be, Wilson said he hoped for a fading of interest in end-state ideologies and end-time religious creation stories because they so fervently deny negotiation.

Charles C. Mann

Living in the Homogenocene: The First 500 Years

April 23, 02012 http://longnow.org/seminars/02012/apr/23/living-homogenocene-first-500-years/

Summary

Written by Stewart Brand

Bio-blender Earth

Tumultuous effects resulted and continue to result from the massive mixing of the world's biota when European ships reconnected the American continent to the rest of the world. Mann traced several of the cascading consequences of "the biggest ecological convulsion since the death of the dinosaurs."

The first momentous change came from microbial exchange---20 lethal diseases came from Europe to the Americas while only one (syphilis) went the other way. North America, which had been largely cleared by natives with fire and agriculture, reforested when two-thirds to 95% of the native inhabitants died from European diseases---"the greatest demographic catastrophe in human history." That huge reforesting drew down atmospheric carbon dioxide and Europe's "Little Ice Age" (1550-1800) apparently resulted.

Meanwhile the mountain of silver at Potosí, Bolivia, vastly enriched Europe, which "went shopping" worldwide. Trading ships coursed the world's oceans. One artifact picked up from Peru was the potato---a single variety of the 6,000 available. When potatoes in Europe turned out to provide four times the amount of food per acre as wheat, the previously routine famines came to an end, population soared, governments became more stable, and they began building global empires. After 1843 guano shipped by the ton from coastal Peru for fertilizer introduced high-input agriculture. In Ireland 40% of the exploding population ate only potatoes. Around 1844 a potato blight arrived from Mexico, and a million Irish died in the Great Famine and a million more emigrated.

In China, which has no large lakes and only two major rivers, agriculture had been limited to two wet regions where rice could be grown. Two imports from America---maize and sweet potato---could be farmed in dry lands. As in Europe, population went up. Vast areas were terraced as Han farmers pushed westward as far as the Mongolian desert. In heavy rains the terraces melted into the streams, and silt built up in the lowlands, elevating the rivers as much as 40 feet above the surrounding terrain, so when they flooded, millions died. "A Katrina per month for 100 years," as one Chinese meteorologist described it. The constant calamities weakened the government, and China became ripe for foreign colonial takeover.

In America two imported diseases---malaria and yellow fever---were selective in who they killed. Europeans died in huge numbers, but Africans were one-tenth as susceptible, and so slavery replaced traditional indentured servitude in all the warm regions that favored mosquito-borne diseases. As one result, four times as many Africans as Europeans crossed the Atlantic and began mixing with the remaining native Americans, giving rise to an endless variety of racial blends and accompanying vitality throughout the Americas.

During the Q & A, Mann described a potential fresh eco-convulsion-in-waiting. "There is an area in southeast Asia roughly the size of Great Britain that is a single giant rubber plantation." Where rubber trees originally came from in the Amazon there is now a rubber tree leaf-blight that is starting to spread in Asia. "You could lose all the rubber trees in three to six months. It would be the biggest deforestation in a long time." The entire auto industry, he added, depends on just-in-time delivery of rubber.

Susan Freinkel

Eternal Plastic: A Toxic Love Story

May 22, 02012 http://longnow.org/seminars/02012/may/22/eternal-plastic-toxic-love-story/

Summary

Written by Stewart Brand

Making plastic even better

Plastic is so new, Freinkel began, that among all the objects preserved in the sunken *Titanic*, none are synthetic plastic, because there was hardly any available in 1912. Natural plastic, however, was a familiar material. Amber was popular. Rubber was essential (all plant cellulose is made of long-chain polymers). Ivory for everything from billiard balls to piano keys was in such high demand that an 1867 paper warned about the looming extinction of elephants. The first synthetic plastic---celluoid---was developed as a substitute for ivory, and the elephants survived.

Bakelite was invented in 1907 to replace the beetle excretion called shellac ("It took 16,000 beetles six months to make a pound of shellac."), and was first used to insulate electrical wiring. Soon there were sturdy Bakelite radios, telephones, ashtrays, and a thousand other things. The technology democratized consumption, because mass production made former luxury items cheap and attractive. The 1920s and ‘30s were a golden age of plastic innovation, with companies like Dow Chemical, DuPont, and I. G. Farben creating hundreds of new varieties of plastic for thrilled consumers. Cellophane became a cult. Nylons became a cult. A plastics *trade* show in 1946 had 87,000 members of the public lining up to view the wonders. New fabrics came along---Orlon and Dacron---as colorful as the deluge of plastic toys---Barbie, the Frisbee, Hula hoops, and Silly Putty.

Looking for new markets, the marketers discovered disposability---disposable cups for drink vending machines, disposable diapers ("Said to be responsible for the baby boom"), Bic lighters, soda bottles, medical syringes, and the infinite market of packaging. Americans consume 300 pounds of plastic a year. The variety of plastics we use are a problem for

recycling, because they have to be sorted by hand. They all biodegrade eventually, but at varying rates. New bio-based polymers like "corn plastic" and "plant bottles" have less of a carbon footprint, but they biodegrade poorly. Meanwhile, thanks to the efficiencies of fracking, the price of natural gas feedstock is plummeting, and so is the price of plastic manufacture.

Some plastics have some chemicals like bisphenol A and phthalates that are toxic. American manufacturers don't have to list the materials in their products, and there's no hope of testing every one of the 80,000 industrialized chemicals loose in the world. Freinkel recommends greatly expanding the practice of "green chemistry," so that every process and product of manufacturing is safe and sustainable from the ground up. She would like to see a stronger regulatory environment and the building of a fully systemic recycling infrastructure.

In the Q & A Freinkel recommended a book by Elizabeth Grossman, *Chasing Molecules: Poisonous Products, Human Health, and the Promise of Green Chemistry*.

Benjamin Barber

If Mayors Ruled the World

June 5, 02012 http://longnow.org/seminars/02012/jun/05/if-mayors-ruled-world/

Summary

Written by Stewart Brand

City-based global governance

Sovereign nation states have conspicuously failed to cooperate well enough to deal with increasingly global problems such as climate change, environmental degradation, and organized crime, Barber said. Nations focus on their borders, which are seen as competitive zero-sum games. “But if we shift our gaze, in thinking about global governance, from nation states to cities, things suddenly become possible that seemed impossible. Cities are apart from one another, separated by wide spaces. Their relationships are based on communication, trade, transportation, and culture. They are relational, not in a zero-sum game with one another.”

Cities are inherently pragmatic rather than ideological. “They collect garbage and collect art rather than collecting votes or collecting allies. They put up buildings and run buses rather than putting up flags and running political parties. They secure the flow of water rather than the flow of arms. They foster education and culture in place of national defense and patriotism. They promote collaboration, not exceptionalism.”

An honoring of all that practicality is shown by polling results of confidence in various levels of government. Only 18 percent of Americans have confidence in the US Congress (“the lowest in a long time”). The Presidency gets 44 percent. Americans have 65 percent confidence in their mayors. They can see clearly that city governments are less distorted by party politics, less responsive to massive lobbying. They see mayors getting things done.

New York City’s “hyperactive” mayor Michael Bloomberg says, “I don’t listen to Washington very much. The difference between my level of

government and other levels of government is that action takes place at the city level. While national government at this time is just unable to do anything, the mayors of this country have to deal with the real world." After 9/11, New York's police chief sent his best people to Homeland Security to learn about dealing with terrorism threats. After 18 months they reported, "We're learning nothing in Washington." They were sent then to twelve other cities---Singapore, Hong Kong, Paris, Frankfurt, Rio---and built their own highly effective intelligence network city to city, not through Washington or Interpol.

Last year following the meeting in Mexico City on climate, where little progress was made by the national delegations, representatives from 207 cities signed a Global Cities Climate Pact pledging to pursue "strategies and actions aimed at reducing greenhouse gas emissions." The cities did what the nations could not. There are many existing bodies of robust cooperation among cities---the International Union of Local Authorities, the World Association of Major Metropolises, the American League of Cities, the Local Governments for Sustainability, the C40 Cities Climate Leadership Group, the United Cities and Local Governments at the UN, the New Hanseatic League, the Megacities Foundation---200 such networking organizations. "They are dull sounding, but they are fashioning global processes that work."

Global governance needs no great edifice with unitary rulers. It can be voluntary, informal, bottom-up. Barber recommends forming a global parliament of cities, because nation states will not govern globally. Cities can. They already are.

Cory Doctorow

The Coming Century of War Against Your Computer

July 31, 02012 http://longnow.org/seminars/02012/jul/31/coming-century-war-against-your-computer/

Summary

Written by Stewart Brand

Who governs digital trust?

Doctorow framed the question this way: "Computers are everywhere. They are now something we put our whole bodies into---airplanes, cars---and something we put into our bodies---pacemakers, cochlear implants. They HAVE to be trustworthy."

Sometimes humans are not so trustworthy, and programs may override you: "I can’t let you do that, Dave." (Reference to the self-protective insane computer Hal in Kubrick’s film "2001." That time the human was more trustworthy than the computer.) Who decides who can override whom?

The core issues for Doctorow come down to Human Rights versus Property Rights, Lockdown versus Certainty, and Owners versus mere Users.

Apple computers such as the iPhone are locked down---it lets you run only what Apple trusts. Android phones let you run only what you trust. Doctorow has changed his mind in favor of a foundational computer device called the "Trusted Platform Module" (TPM) which provides secure crypto, remote attestation, and sealed storage. He sees it as a crucial "nub of secure certainty" in your machine---but only to the extent that it is implemented to allow owners to choose what they trust---not vendors or governments.

If it’s your machine, you rule it. It‘s a Human Right: your computer should not be overridable. And a Property Right: "you own what you buy, even if it what you do with it pisses off the vendor." That’s clear when the Owner and the User are the same person. What about when they’re not?

There are systems where there is a credible argument for the authorities to rule---airplanes, nuclear reactors, probably self-driving cars ("as a species we are terrible drivers.")---but at least in the case of cars, and possibly in the other two, it will not make us safer; it will make us less safe. The firmware in those machines should be inviolable by users and outside attackers. But the power of Owners over Users can be deeply troubling, such as in matters of surveillance. There are powers that want full data on what Users are up to---governments, companies, schools, parents. Behind your company computer is the IT department and the people they report to. They want to know all about your email and your web activities, and there is reason for that. But we need to contemplate the "total and terrifying power of Owners over Users."

Recognizing that we are necessarily transitory Users of many systems, such as everything involving Cloud computing or storage, Doctorow favors keeping your own box with its own processors and storage. He strongly favors the democratization and wide distribution of expertise. As a Fellow of the Electronic Frontier Foundation (who co-sponsored the talk) he supports public defense of freedom in every sort of digital rights issue.

"The potential for abuse in the computer world is large," Doctorow concluded. "It will keep getting larger."

Elaine Pagels

The Truth About the Book of Revelations

August 20, 02012 http://longnow.org/seminars/02012/aug/20/truth-about-book-revelations/

Summary

Written by Stewart Brand

War in heaven

"The *Book of Revelation* is war literature," Pagels explained. John of Patmos was a war refugee, writing sixty years after the death of Jesus and twenty years after 60,000 Roman troops crushed the Jewish rebellion in Judea and destroyed Jerusalem.

In the nightmarish visions of John's prophecy, Rome is Babylon, the embodiment of monstrous power and decadence. That power was expressed by Rome as religious. John would have seen in nearby Ephesus massive propaganda sculptures depicting the contemporary emperors as gods slaughtering female slaves identified as Rome's subject nations. And so in the prophecy the ascending violence reaches a crescendo of war in heaven. Finally, summarized Pagels, "Jesus judges the whole world; and all who have worshipped other gods, committed murder, magic, or illicit sexual acts are thrown down to be tormented forever in a lake of fire, while God's faithful are invited to enter a new city of Jerusalem that descends from heaven, where Christ and his people reign in triumph for 1000 years."

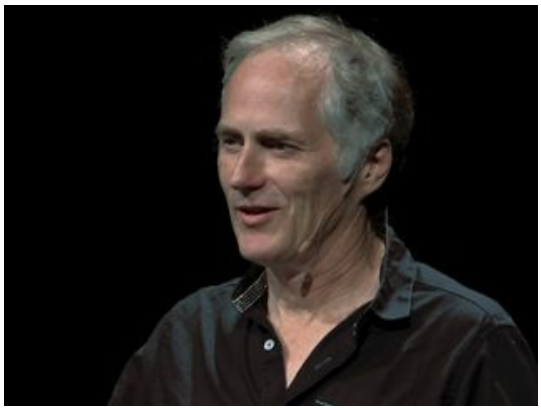
Just one among the dozens of revelations of the time (Ezra's, Zostrianos', Peter's, a different John's), the vision of John of Patmos became popular among the oppressed of Rome. Three centuries later, in 367CE, Bishop Athanasius of Alexandria confirmed it as the concluding book in the Christian canon that became the *New Testament*.

As a tale of conflict where one side is wholly righteous and the other wholly evil, the *Book of Revelation* keeps being evoked century after century. Martin Luther declared the Pope to be the Whore of Babylon. Both sides of the American Civil War declared the opposing cause to be

Bestial, though the North had the better music---"He hath loosed the fateful lightning of His terrible swift sword." African-American slaves echoed John's lament: "*How long* before you judge and avenge our blood on the inhabitants of the earth?"

But like many Christians through the years, Pagels wishes that John's divisive vision had not become part of the Biblical canon. Among the better choices from that time, she quoted from the so-called "Secret Revelation of John": "Jesus says to John, 'The souls of everyone will live in the pure light, because if you did not have God's spirit, you could not even stand up.'

"The other revelations are universal, instead of being about the saved versus the damned."



Tim O'Reilly

Birth of the Global Mind

September 5, 02012 http://longnow.org/seminars/02012/sep/05/birth-global-mind/

Summary

Written by Stewart Brand

The global mind is us, augmented

As a student of the classics at Harvard in the 1970s, O'Reilly was impressed by a book titled *The Discovery of the Mind: In Greek Philosophy and Literature*, by Bruno Snell. In the four centuries between Homer and classical Athens, wrote Snell, the Greeks invented the modern human mind, with its sense of free will and agency. (In Homer, for example, no one makes a decision.) O'Reilly sees a parallel with the emerging of a global mind in this century.

Global consciousness was a recurrent idea in the 1970s---from Teilhard de Chardin's noosphere and Omega point ("the Singularity of its day") to "New Age mumbo-jumbo" such as the Harmonic Convergence. O'Reilly noted that the term "singularity" for technology acceleration was first used in 1958 by John von Neumann. In 1960 J.C.R. Licklider wrote an influential paper titled "Human-computer Symbiosis." O'Reilly predicted that "exploring the possibility space of human-computer symbiosis is one of the fascinating frontiers of the next decades and possibly century."

Echoing Dale Dougherty, he says the Web has become the leading platform for harnessing collective intelligence. Wikipedia is a virtual city. Connected smart phones have become our "outboard brain." Through device automation, Apple has imbued retail clerks with superpowers in its stores. Watson, the AI that beat human champions at "Jeopardy," is now being deployed to advise doctors in real time, having read ALL the scientific papers. YouTube has mastered the attention economy. Humanity has a shared memory in the cloud. Data scientists rule.

The global mind is not an artificial intelligence. It's us, connected and

augmented.

What keeps driving it is the generosity and joy we take in creating and sharing. The global mind is built on the gift culture of every medium of connectedness since the invention of language. You gain status by what you give away, by the value you create, not the value you take.

Steven Pinker

The Decline of Violence

October 8, 02012 http://longnow.org/seminars/02012/oct/08/decline-violence/

Summary

Written by Stewart Brand

The Long Peace

“Nothing can be more gentle than man in his primitive state,” declared Rousseau in the 18th century. A century earlier, Thomas Hobbes wrote, “In the state of nature the life of man is solitary, poor, nasty, brutish, and short.” The evidence shows that Rousseau was wrong and Hobbes was right, said Pinker. Forensic archaeology (“CSI Paleolithic”) reveals that 15 percent of prehistoric skeletons show signs of violent trauma. Ethnographic vital statistics of surviving non-state societies and pockets of anarchy show, on average, 524 war deaths per 100,000 people per year.

Germany in the 20th century, wracked by two world wars, had 144 war deaths per 100,000 per year. Russia had 135. Japan had 27. The US in the 20th century had 5.7. In this 21st century the whole world has a war death rate of 0.3 per 100,000 people per year. In primitive societies 15 percent of people died violently; now 0.03 percent do. Violence is 1/500th of what it used to be.

The change came by stages, each with a different dynamic. Pinker identified: 1) The Pacification Process brought about by the rise and expansion of states, which monopolized violence to keep their citizens from killing each other. 2) The Humanizing Process. States consolidated, enforcing “the king’s justice.” With improving infrastructure, commerce grew, and the zero-sum game of plunder was replaced by the positive-sum game of trade. 3) The Humanitarian Revolution. Following ideas of The Enlightenment, the expansion of literacy, and growing cosmopolitanism, reason guided people to reject slavery, reduce capital crimes toward zero, and challenge superstitious demonizing of witches, Jews, etc. Voltaire wrote: “Those who can make you believe absurdities can make you commit atrocities.”

4) The Long Peace. Since 1945 there has been zero use of nuclear weapons, zero combat between the Cold War superpowers, just one war between great powers (US and China in Korea, ending 1953), zero wars in western Europe (there used to be two new wars a year there, for 600 years), and zero wars between developed countries or expansion of their borders by conquest. 5) The New Peace is the spreading of the Long Peace to the rest of the world, largely through the decline of ideology, and the spread of democracy, trade, and international organizations such as the UN. Colonial wars ended; civil wars did flare up. 6) The Rights Revolution, increasingly powerful worldwide, insists on protection from injustice for blacks, women, children, gays, and animals. Even domestic violence is down.

Such a powerful long-term trend is the result of human ingenuity bearing down on the problem of violence the same way it has on hunger and plague. Something psychologists call the “circle of empathy” has expanded steadily from family to village to clan to tribe to nation to other races to other species. In addition, “humanitarian reforms are often preceded by new technologies for spreading ideas.” It is sometimes fashionable to despise modernity. A more appropriate response is gratitude.

In the Q & A, one questioner noted that violence is clearly down, but fear of violence is still way up. Social psychologist Pinker observed that we base our fears irrationally on anecdotes instead of statistics---one terrorist attack here, one child abduction there. In a world of 7 billion what is the actual risk for any individual? It is approaching zero. That trend is so solid we can count on it and take it further still.

Lazar Kunstmann, Jon Lackman

Preservation without Permission: the Paris Urban eXperiment

November 13, 02012
http://longnow.org/seminars/02012/nov/13/preservation-without-permission-paris-urban-experiment/

Summary

Written by Stewart Brand

Preservation Without Permission

Their video showed clandestine urban “infiltration” (trespassing) at its most creative. Paris’s Urban Experiment group (UX), now in their fourth decade, have a restoration branch called Untergunther. They evade authorities to carry out secret preservation projects on what they call “nonvisible heritage.”

Being clandestine, they do not reveal their activities except for instances that become publicized in the media; then they reveal everything to set the record straight (and embarrass the media along with the authorities). In the video presented by Untergunther member Lazar Kunstmann and translator Jon Lackman, we see a hidden underground screening room and bar beneath the Trocadero in Paris’s Latin Quarter. When police discover it and shut it down, the equipment is surreptitiously removed to a site deeper in the city’s vast network of underground passages, where film showings continue to this day. One year the group’s annual film festival was staged and performed overnight in one of Paris’s great monuments, the Panthéon, built in 1790. In the video (excerpt here) we see a small boy slipping through newly crafted underground passageways, picking a lock, opening the cupboard with all the Panthéon‘s keys, and gliding on his skateboard beneath the great dome across the ornate marble floors by Foucault’s original pendulum as film enthusiasts set up a temporary theater and have a clandestine film festival---gone without a trace by dawn.

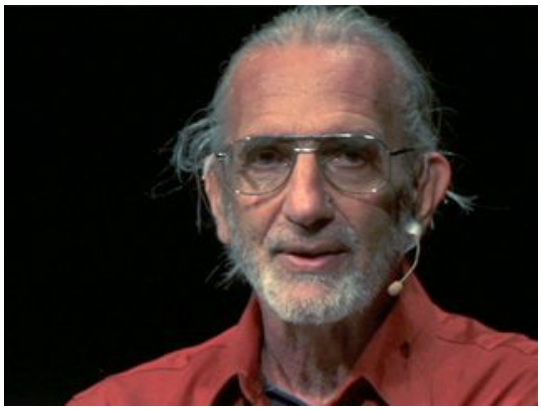
Elsewhere in the Panthéon the explorers found a neglected old clock displaying stopped time to the public. In 2005 they decided to repair it. They converted an abandoned room high in the monument into a clock shop and hangout. With clockmaker (and UX member) Jean-Baptiste Viot

they spent a year completely reconditioning the 1850 works of the clock. Now that it worked again, they thought it should keep time and chime proudly, but someone needed to wind it. They approached the Director of the Panthéon, Bernard Jeannot, who didn't even know that the monument had a clock. At first dumbfounded, Jeannot publicly embraced the project and applauded Untergunther.

Jeannot's superiors at the Centre des Monuments Nationaux accordingly fired him (early retirement) and brought suit against Untergunther. The court determined that fixing clocks is not a crime, and in France trespassing on public property is, in itself, not a crime. Case dismissed. Spitefully, the new Director of the Panthéon has made sure the clock remains unwound, and he disabled it by removing an essential part.

Lazar Kunstmann explained (through Jon Lackman) Untergunther's perspective on cultural heritage, particularly "minor" heritage---the countless objects that embody cultural continuity but don't attract institutions to protect them. Who is responsible for such "nonvisible" heritage? The protectors should be local, self-appointed, and nonvisible themselves, because exposure of the value of the objects attracts destructive tourists. Preservation without permission works best without visibility.

Since 2005, Untergunther's new precautions against discovery have successfully kept its ongoing preservation projects hidden. As for the Panthéon clock, that essential part the Director removed to disable it has been purloined to safekeeping with Untergunther. Someday authorities may allow the clock to tick again. In the meantime it is in good repair.



Peter Warshall

Enchanted by the Sun: The CoEvolution of Light, Life, and Color on Earth

November 28, 02012
http://longnow.org/seminars/02012/nov/28/enchanted-sun-coevolution-light-life-and-color-earth/

Summary

Written by Stewart Brand

Light and beauty

“The naturalist’s task,” Warshall began, “is to observe without human-centered thoughts and human-centered agendas, to observe with a Gaian perspective and with the perspective of the organisms you’re watching. The naturalist considers all species in space/time as equally beautiful.” There’s a connection between art and science---between the poetic organization of thought and the pragmatic organization of thought. Light operates at a distance. That inspires anticipation, which becomes yearning, which becomes desire, which becomes hope, which generates transcendence. When an image becomes transcendent for you, it becomes part of how you perceive. “The Sun is the initiator of all sugars.”

Starting 250 million years ago, life rebelled and began generating its own light. There are 40 different kinds of bioluminescence, used for mate attraction, for baiting prey, for deceit. “Danger and beauty always go together. Deceit---not truth---is beauty. A term some art critics use is ‘abject beauty.’” Humans began the second light rebellion by harnessing fire a million years ago. Then came electric lights in the 1880s, and we transformed the light regime and hence behavior of many species. Artists like James Turrell shifted art from reflected light to emitted light, and that is increasingly the norm as we spend our days with screens radiating information into our eyes.

Our eyes are pockets of ocean that let us perceive only a portion of the Sun’s spectrum of light. Bees, with their crystal eyes, see in the ultraviolet. Snakes perceive infrared, and so do some insects that can detect the heat of a forest fire from 40 miles away.

Bowerbird males create elaborate art galleries, even devising forced

perspective, to impress females. Young male bowerbirds watch the process for four years to learn the art. Throughout nature, watch for bold patterns of white, black, and red, which usually signal danger.

Every day there is a brief time without danger. At twilight---as daylight shifts to night---all life pauses. “That moment has a contemplative beauty that we cherish. It is a moment of Gaian aesthetic.”

Warshall’s talk, and his life, have been a convergence of art and science. Asked about how scientists could learn more about art, Warshall suggested they go to an art class and learn how to draw. As for how artists can learn more of science, he had two words:

“Outdoors. Look.”

Terry Hunt, Carl Lipo

The Statues Walked -- What Really Happened on Easter Island

January 17, 02013 http://longnow.org/seminars/02013/jan/17/statues-walked-what-really-happened-easter-island/

Summary

Written by Stewart Brand

Easter Island reconsidered

In the most isolated place on Earth a tiny society built world-class monuments. Easter Island (Rapa Nui) is 1,000 miles from the nearest Pacific island, 3,000 miles from the nearest continent. It is just six by ten miles in size, with no running streams, terrible soil, occasional droughts, and a relatively barren ocean. Yet there are 900 of the famous statues (moai), weighing up to 75 tons and 40 feet high. Four hundred of them were moved many miles from where they were quarried to massive platforms along the shores.

Terry Hunt and Carl Lipo began their archeological work on Easter Island in 2001 expecting to do no more than add details to the standard morality tale of the collapse of the island's ecology and society---Polynesians discovered Rapa Nui around 400-800AD and soon overpopulated the place (30,000 people on an island the size of San Francisco); competing elites cut down the last trees to move hundreds of enormous statues; after excesses of "moai madness" the elites descend into warfare and cannibalism, and the ecology collapses; Europeans show up in 1722. The obvious lesson is that Easter Island, "the clearest example of a society that destroyed itself" (Jared Diamond), is a warning of what could happen to Earth unless we learn to live with limits.

A completely different story emerged from Hunt and Lipo's archaeology. Polynesians first arrived as late as 1200AD. There are no signs of violence---none of the fortifications common on other Pacific islands, no weapons, no traumatized skeletons. The palm trees that originally covered the island succumbed mainly to rats that arrived with the Polynesians and ate all the nuts. The natives burned what remained to enrich the poor soil and then engineered the whole island with small

rocks (“lithic mulch”) to grow taro and sweet potatoes. The population stabilized around 4,000 and kept itself in balance with its resources for 500 years until it was totally destroyed in the 18th century by European diseases and enslavement. (It wasn’t *Collapse*; it was *Guns, Germs, and Steel*.)

What was up with the statues? How were they moved? Did they have a role in the sustainable balance the islanders achieved? Hunt and Lipo closely studied the statues found along the moai roads from the quarry. They had D-shaped beveled bottoms (unlike the flat bottoms of the platform statues) angled 14 ° forward. The ones on down slopes had fallen on their face; on up slopes they were on their back. The archeologists concluded they must have been moved upright---”walked,” just as Rapa Nuians long had said. No tree logs were required. Standard Polynesian skill with ropes would suffice.

“Nova” and National Geographic insisted on a demonstration, so a 5-ton, 10-foot-high “starter moai” replica was made and shipped to Hawaii. After some fumbling around, 18 unskilled people secured three ropes around the top of the statue---one to each side for rocking the statue, one in the rear to keep it leaning forward without falling. “Heave! Ho! Heave! Ho!” they cry in the video, the statue rocks, dancing lightly forward, and the audience at Cowell Theater erupts with applause. Progress was fast, even hard to stop---100 yards in 40 minutes. A family could move one.

Stone statues to ancestors are common throughout Polynesia, but the enormous, numerous moai of Easter Island are unique in the world. Were they part of the peaceful population control and conservative agriculture regime that helped the society “optimize long-term stability over immediate returns” in a nearly impossible place to live?

During the Q & A, Hunt and Lipo were asked how their new theory of Easter Island history was playing on the island itself. Shame at being the self-destructive dopes of history has been replaced by pride, they said.

Moai races are being planned. Polynesians were the space explorers of the Pacific. They completed discovering every island in the huge ocean by the end of the 13th century, colonized the ones they could, and then stopped.

Easter Island is not Earth. It is Mars.

Chris Anderson

The Makers Revolution

February 19, 02013 http://longnow.org/seminars/02013/feb/19/makers-revolution/

Summary

Written by Stewart Brand

Desktop manufacturing changes world

We’re now entering the third industrial revolution, Anderson said. The first one, which began with the spinning jenny in 1776, doubled the human life span and set population soaring. From the demographic perspective, "it’s as if nothing happened before the Industrial Revolution."

The next revolution was digital. Formerly industrial processes like printing were democratized with desktop publishing. The "cognitive surplus" of formerly passive consumers was released into an endless variety of personal creativity. Then distribution was democratized by the Web, which is "scale agnostic and credentials agnostic." Anyone can potentially reach 7 billion people.

The third revolution is digital manufacturing, which combines the gains of the first two revolutions. Factory robots, which anyone can hire, have become general purpose and extremely fast. They allow "lights-out manufacturing," that goes all night and all weekend.

"This will reverse the arrow of globalization," Anderson said. "The centuries of quest for cheaper labor is over. Labor arbitrage no longer drives trade." The advantages of speed and flexibility give the advantage to "locavore" manufacturing because "Closer is faster." Innovation is released from the dead weight of large-batch commitments. Designers now can sit next to the robots building their designs and make adjustments in real time.

Thus the Makers Movement. Since 2006, Maker Faires, Hackerspaces, and TechShops (equipped with laser cutters, 3D printers, and CAD design

software) have proliferated in the US and around the world. Anderson said he got chills when, with the free CAD program Autodesk 123D, he finished designing an object and moused up to click the button that used to say "Print." This one said "Make." A 3D printer commenced building his design.

Playing with Minecraft, "kids are becoming fluent in polygons." With programs like 123D Catch you can take a series of photos with your iPhone of any object, and the software will create a computer model of it. "There is no copyright on physical stuff," Anderson pointed out. The slogan that liberated music was "Rip. Mix. Burn." The new slogan is "Rip. Mod. Make."

I asked Anderson, "But isn't this Makers thing kind of trivial, just trailing-edge innovation?" "That's why it's so powerful," Anderson said. "Remember how trivial the first personal computers seemed?"

George Dyson

No Time Is There--- The Digital Universe and Why Things Appear To Be Speeding Up

March 19, 02013 http://longnow.org/seminars/02013/mar/19/no-time-there-digital-universe-and-why-things-appear-be-speeding/

Summary

Written by Stewart Brand

The digital big bang

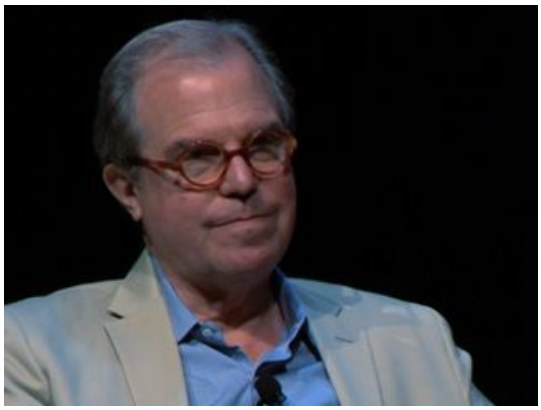
When the digital universe began, in 1951 in New Jersey, it was just 5 kilobytes in size. "That's just half a second of MP3 audio now," said Dyson. The place was the Institute for Advanced Study, Princeton. The builder was engineer Julian Bigelow. The instigator was mathematician John von Neumann. The purpose was to design hydrogen bombs.

Bigelow had helped develop signal processing and feedback (cybernetics) with Norbert Wiener. Von Neumann was applying ideas from Alan Turing and Kurt Gödel, along with his own. They were inventing and/or gates, addresses, shift registers, rapid-access memory, stored programs, a serial architecture—all the basics of the modern computer world, all without thought of patents. While recuperating from brain surgery, Stanislaw Ulam invented the Monte Carlo method of analysis as a shortcut to understanding solitaire. Shortly Von Neumann's wife Klári was employing it to model the behavior of neutrons in a fission explosion. By 1953, Nils Barricelli was modeling life itself in the machine—virtual digital beings competed and evolved freely in their 5-kilobyte world.

"In the few years they ran that machine, from 1951 to 1957, they worked on the most difficult problems of their time, five main problems that are on very different time scales—26 orders of magnitude in time—from the lifetime of a neutron in a bomb's chain reaction measured in billionths of a second, to the behavior of shock waves on the scale of seconds, to weather prediction on a scale of days, to biological evolution on the scale of centuries, to the evolution of stars and galaxies over billions of years. And our lives, measured in days and years, is right in the middle of the scale of time. I still haven't figured that out."

Julian Bigelow was frustrated that the serial, address-constrained, clock-driven architecture of computers became standard because it is so inefficient. He thought that templates (recognition devices) would work better than addresses. The machine he had built for von Neumann ran on sequences rather than a clock. In 1999 Bigelow told George Dyson, "Sequence is different from time. No time is there." That's why the digital world keeps accelerating in relation to our analog world, which is based on time, and why from the perspective of the computational world, our world keeps slowing down.

The acceleration is reflected in the self-replication of computers, Dyson noted: "By now five or six trillion transistors per second are being added to the digital universe, and they're all connected." Dyson is a kayak builder, emulating the wood-scarce Arctic natives to work with minimum frame inside a skin craft. But in the tropics, where there is a surplus of wood, natives make dugout canoes, formed by removing wood. "We're now surrounded by so much information," Dyson concluded, "we have to become dugout canoe builders. The buzzword of last year was 'big data.' Here's my definition of the situation: Big data is what happened when the cost of storing information became less than the cost of throwing it away."



Nicholas Negroponte

Beyond Digital

April 17, 02013 http://longnow.org/seminars/02013/apr/17/beyond-digital/

Summary

Written by Stewart Brand

A world of convergence

In education, Negroponte explained, there's a fundamental distinction between "instructionism" and "constructionism." "Constructionism is learning by discovery, by doing, by making. Instructionism is learning by being told." Negroponte's lifelong friend Seymour Papert noted early on that debugging computer code is a form of "learning about learning" and taught it to young children.

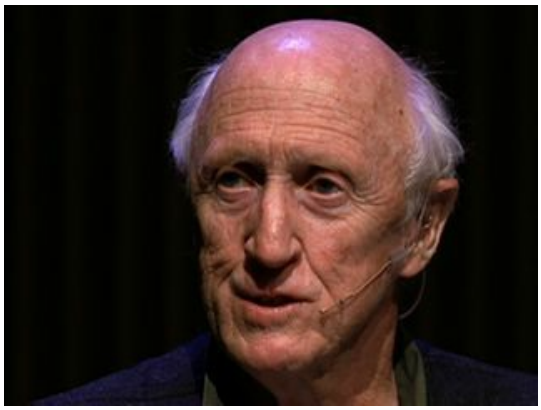
Thus in 2000 when Negroponte left the Media Lab he had founded in 1985, he set out upon the ultimate constructionist project, called "One Laptop per Child." His target is the world's 100 million kids who are not in school because no school is available. Three million of his laptops and tablets are now loose in the world. One experiment in an Ethiopian village showed that illiterate kids can take unexplained tablets, figure them out on their own, and begin to learn to read and even program.

In the "markets versus mission" perspective, Negroponte praised working through nonprofits because they are clearer and it is easier to partner widely with people and other organizations. He added that "start-up businesses are sucking people out of big thinking. So many minds that used to think big are now thinking small because their VCs tell them to 'focus.'"

As the world goes digital, Negroponte noted, you see pathologies of left over "atoms thinking." Thus newspapers imagine that paper is part of their essence, telecoms imagine that distance should cost more, and nations imagine that their physical boundaries matter. "Nationalism is the biggest disease on the planet," Negroponte said. "Nations have the wrong granularity. They're too small to be global and too big to be local, and all

they can think about is competing." He predicted that the world is well on the way to having one language, English.

Negroponte reflected on a recent visit to a start-up called Modern Meadow, where they print meat. "You get just the steak---no hooves and ears involved, using one percent of the water and half a percent of the land needed to get the steak from a cow." In every field we obsess on the distinction between synthetic and natural, but in a hundred years "there will be no difference between them."



Stewart Brand

Reviving Extinct Species

May 21, 02013 http://longnow.org/seminars/02013/may/21/reviving-extinct-species/

Summary

Written by Stewart Brand

De-extinction begins

The new tools of synthetic biology, I began, are about to liberate conservation in a spectacular way. It is becoming possible to bring some extinct species back to life.

A project within Long Now called “Revive & Restore” is pushing to make de-extinction a reality, starting with the fabled passenger pigeon and moving on to the woolly mammoth. The project’s director, Ryan Phelan, organized a series of three conferences bringing together molecular biologists and conservation biologists to see if “resurrection biology” is becoming a field and how it might proceed responsibly. (The most viewable of the conferences was “TEDxDeExtinction” in Washington DC this March.)

At those conferences we heard about cloning efforts that are already partially successful. Alberto Fernández Arias in Spain temporarily brought back an extinct ibex called the bucardo. Michael Archer, from Australia, reported reviving an early stage embryo of the extinct gastric brooding frog. Using traditional back-breeding, Henri Kerkdijk-Otten, is rebuilding the European aurochs (extinct in 1627) from a variety its descendent modern cattle. William Powell is showing how the nearly extinct beloved American chestnut tree is being brought back by a combination of back-breeding and sophisticated genetic engineering.

Robert Lanza (Advanced Cell Technology), Oliver Ryder (The Frozen Zoo), and Michael McGrew (Roslin Institute) showed miracles that can now be accomplished with advanced cloning and induced pluripotent stem cells. Beth Shapiro (UC Santa Cruz) and Hendrik Poinar (McMaster University) explained how complete genomes are being read from the

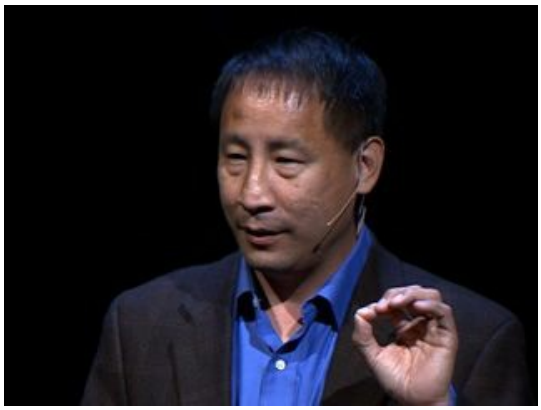
“ancient DNA” of fossils and museum specimens. George Church (Harvard) spelled out his allele replacement technique that will allow editing the genes from an extinct species into the genome of its closest living relative---from the passenger pigeon into the band-tailed pigeon, for example---thereby bringing back to life the extinct animal.

Ben Novak is working full-time for Revive & Restore on the passenger pigeon and is now in the thick of sequencing work and comparative genomics in Beth Shapiro’s ancient-DNA lab at UC Santa Cruz.

Conservation biologists like Stanley Temple, Kent Redford, and Frans Vera regard de-extinction as “a game-changer for conservation.” On the one hand, it dilutes the stark message “Extinction is forever!” while on the other hand it offers a message of hope that conservation can build on.

I concluded, “The fact is, humans have made a huge hole in nature over the last 10,000 years. But now we have the ability to repair some of the damage. We’ll do most of the repair by expanding and protecting wild areas and by expanding and protecting the populations of endangered species.

“Some species that we killed off totally, we might consider bringing back to a world that misses them.”



Ed Lu

Anthropocene Astronomy: Thwarting Dangerous Asteroids Begins with Finding Them

June 18, 02013 http://longnow.org/seminars/02013/jun/18/anthropocene-astronomy-thwarting-dangerous-asteroids-begins-finding-them/

Summary

Written by Stewart Brand

The last killer asteroid

Kevin Kelly wrote the following about Ed Lu's Seminar About Long-term Thinking (SALT) titled "Anthropocene Astronomy: Thwarting Dangerous Asteroids Begins with Finding Them"...

Last night's SALT talk was one of the most important ones we ever hosted. For several reasons:

1. Nine years ago, SALT hosted Rusty Schweickart's talk on the long term asteroid problem, wherein he presented the problem and challenge. Now nine years later, Ed Lu presented a very workable solution. There's an arc of thinking big over a span of time that we participated in.
2. While most SALT talks focus on problems, last night's was extremely focused on a solution.
3. The solution itself is a (workable) long term project, that has a delayed gratification.
4. The problem being solved is neither trivial nor superficial but complicated and existential. It's a big deal.
5. If B612 was not already doing this, it would make a perfect Long Now project.

--KK

I agree. Consider this summary a pitch to donate to the cause. I'll end with a link to B612's website.

Lu began by noting that deflecting lethal asteroids is the easy part. We know how to do it and already have the needed technology. Years before

a threatening asteroid converges with Earth, we can ram it from behind with a rocket with the precise amount of energy needed to speed it up just enough to miss our planet and keep on missing us in the future.

Funding such a mission will be straightforward. Once you know when (and even where) a catastrophic impact will occur, there will be abundant motivation to pay for heading it off. With good sky reconnaissance, we'll have years of warning. But that reconnaissance doesn't exist yet.

Detection of asteroids is the hard part. There are about a million near-Earth objects (NEOs) of dangerous size (over 50 meters), but only one percent of them---10,000---have been located so far.

The best way to locate the rest is with an infrared-detecting telescope following Venus in its orbit around the Sun, looking outward to Earth's orbit. With the intense radiation of the Sun behind it, the telescope can detect the infrared glow of asteroids and precisely gauge their size and orbits, building a detailed threat map good for centuries.

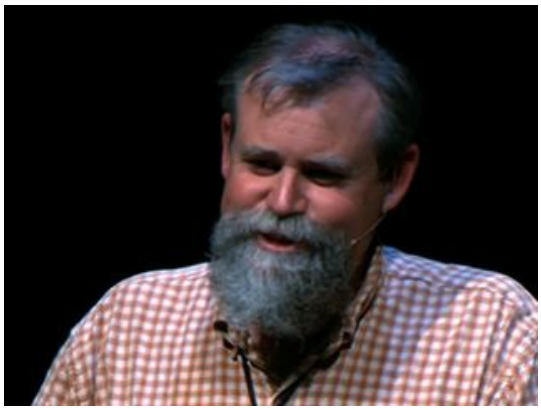
What are we looking for? Asteroids that Lu calls "city killers" are about the size of a theater---an airburst of one could destroy the whole San Francisco Bay Area. "In our children's lifetime the chance of impact from one of these is about 30 percent." In the same period there is a 1 percent chance of an asteroid impact equivalent to all the bombs in World War II times 5; it could kill 100 million people. "We buy fire insurance against risk with lower probability than that." Then there's a kilometer-size asteroid, which would destroy all of humanity permanently. The chance of collision with one in our children's lifetime---.001 percent.

No government has stepped up to detecting asteroids in the detail needed, so astronauts Rusty Schweickart and Ed Lu and their B612 Foundation set about doing it with non-government money and non-government efficiency. The cost and schedule for getting a superb telescope designed, built, and in the orbit of Venus is $200 million, 5 years. The telescope,

called Sentinel, has been designed by the world's best space telescope crafters. Coordination with (highly enthusiastic) NASA has been worked out. Launch is planned for 2018.

Now it's a matter of funding. The current milestone goal is $20 million. For perspective, Lu reminded his San Francisco audience that the refit of the city's Museum of Modern Art, now underway, is expected to cost $500 million and be good for about 50 years. At half the cost of a refreshed museum (a worthy cause), the funders of Sentinel can save the whole world, permanently.

B612's website is here.



Craig Childs

Apocalyptic Planet: Field Guide to the Everending Earth

July 29, 02013 http://longnow.org/seminars/02013/jul/29/apocalyptic-planet-field-guide-everending-earth/

Summary

Written by Stewart Brand

How the world keeps ending

“This Earth is a story teller,” Childs began. “And it is not a stable place to live. It is always ending. We think of endings as sudden, but it is always a process.”

For his book *Apocalyptic Planet* he sought out some of the world’s most terminal-feeling places, where everything is reduced to fundamental elements in total upheaval or total stasis, and a visitor is overwhelmed by the scale and power of a planet going about its planetary business.

In Yosemite Valley, where Childs was the day before he spoke in San Francisco, everyone is awed by the results of massive glacial action. In a sense Yosemite is the future of where he had been the previous week--- a part of Alaska where the ice is 1,000 feet thick, with mountain peaks just visible above the glacial carving. Still further in the past is a classic end-of-the-world---an Ice Age. Childs sampled what that is like with an extended stay on the Greenland ice cap, where all there is for hundreds of miles is ice, sky, and wind. And numbing cold. The ice is 5,000 feet thick, moving under his camp at 1 foot a day, eventually calving off into enormous icebergs.

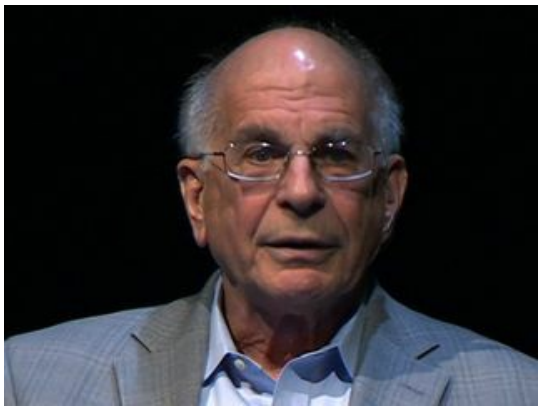
He was in Greenland with a chaos scientist studying climate change, who noted that complex systems like climate sometimes change suddenly, and that’s when you can’t predict what will happen next.

“I would like to backpack on Mars,” said Childs. For the local equivalent he hiked across the Atacama Desert in northern Chile, where it never rains. It’s been a desert for 150 million years. You walk across nothing but salt so hard it pings like steel. The sun blasts you all day and at night

the water in your pack freezes solid. “You walk for days and you don’t see a single living thing, you’re on a dead planet, and then it gets really strange because pink flamingoes come flying in over your head. They’re there to strain brine shrimp out of water sources. You’re at the end of the world and there are flamingoes! You think, 'Yeah, that’s what this planet is about.'”

To experience a world without biodiversity he hiked for days in cornfields in Iowa, where 90 percent of the state is monocrop corn and soybeans. Yet it took just two years for tallgrass prairie to be re-established in a site where corn growing was stopped.

In the lava fields of Hawaii he got a sense of planetary beginnings when the magma escapes, flowing like liquid incandescent metal, and everything starts over. Life is reseeded from what are called kipukas, bits of forest missed by the lava. Plunging into some new forest densely regrown on recent lava, he was instantly lost, buried in an orgy of jungle vegetation, no animals yet, and he realized that “The force of the living is more cunning than any devastation, ready to explode on whatever it touches.”



Daniel Kahneman

Thinking Fast and Slow

August 13, 02013 http://longnow.org/seminars/02013/aug/13/thinking-fast-and-slow/

Summary

Written by Stewart Brand

On taking thought

Before a packed house, Kahneman began with the distinction between what he calls mental “System 1”---fast thinking, intuition---and “System 2”---slow thinking, careful consideration and calculation. System 1 operates on the illusory principle: *What you see is all there is*. System 2 studies the larger context. System 1 works fast (hence its value) but it is unaware of its own process. Conclusions come to you without any awareness of how they were arrived at. System 2 processes are self-aware, but they are lazy and would prefer to defer to the quick convenience of System 1.

“Fast thinking,” he said, “is something that happens to you. Slow thinking is something you do.“

System 2 is effortful The self-control it requires can be depleted by fatigue. Research has shown that when you are tired it is much harder to perform a task such as keeping seven digits in mind while solving a mental puzzle, and you are more impulsive (I’ll have some chocolate cake!). You are readier to default to System 1.

“The world in System 1 is a lot simpler than the real world,” Kahneman said, because it craves coherence and builds simplistic stories. “If you don’t like Obama’s politics, you think he has big ears.” System 1 is blind to statistics and focuses on the particular rather than the general: “People are more afraid of dying in a terrorist incident than they are of dying.”

When faced with a hard question such as, “Should I hire this person?” we convert it to an easier question: “Do I like this person?“ (System 1 is good at predicting likeability.) The suggested answer pops up, we endorse

it, and believe it. And we wind up with someone affable and wrong for the job.

The needed trick is knowing when to distrust the easy first answer and bear down on serious research and thought. Organizations can manage that trick by requiring certain protocols and checklists that invoke System 2 analysis. Individual professionals (athletes, firefighters, pilots) often use training to make their System 1 intuition extremely expert in acting swiftly on a wider range of signals and options than amateurs can handle. It is a case of System 2 training System 1 to act in restricted circumstances with System 2 thoroughness at System 1 speed. It takes years to do well.

Technology can help, the way a heads-up display makes it possible for pilots to notice what is most important for them to act on even in an emergency. The Web can help, Kahneman suggested in answer to a question from the audience, because it makes research so easy. “Looking things up exposes you to alternatives. This is a profound change.”

Peter Schwartz

The Starships ARE Coming

September 17, 02013
http://longnow.org/seminars/02013/sep/17/starships-are-coming/

Summary

Written by Stewart Brand

Starship destiny

We now know, Schwartz began, that nearly all of the billions of stars in our galaxy have planets. If we can master interstellar travel, "there's someplace to go." Our own solar system is pretty boring---one planet is habitable, the rest are "like Antarctica without ice" or worse.

So this last year a number of researchers and visionaries have begun formal investigation into the practicalities of getting beyond our own solar system. It is an extremely hard problem, for two primary reasons---the enormous energy required to drive far and fast, and the vast amount of time it takes to get anywhere even at high speed.

The energy required can be thought of in three ways. 1) Impossible---what most scientists think. 2) Slow. 3) Faster than light (FTL). Chemical rockets won't do at all. Nuclear fission rockets may suffice for visiting local planets, but it would take at least fusion to get to the planets of other stars. Schwartz showed Adam Crowl's scheme for a Bussard Ramjet using interstellar ions for a fusion drive. James Benford (co-author of the book on all this, *Starship Century*) makes the case for sail ships powered by lasers based in our Solar System.

As for faster-than-light, that requires "reinventing physics." Physics does keep doing that (as with the recent discovery of "dark energy"). NASA has one researcher, Harold White, investigating the potential of microscopic wormholes for superluminal travel.

Standard-physics travel will require extremely long voyages, much longer than a human lifetime. Schwartz suggested four options. 1) Generational ships---whole mini-societies commit to voyages that only

their descendents will complete. 2) Sleep ships---like in the movie "Avatar," travelers go into hibernation. 3) Relativistic ships---at near the speed of light, time compresses, so that travelers may experience only 10 years while 100 years pass back on Earth. 4) Download ships---"Suppose we learn how to copy human consciousness into some machine-like device. Such 'iPersons' would be able to control an avatar that could function in environments inhospitable to biological humans. They would not be limited to Earthlike planets."

Freeman Dyson has added an important idea, that interstellar space may be full of objects---comets and planets and other things unattached to stars. They could be used for fuel, water, even food. "Some of the objects may be alive." Dyson notes that, thanks to island-hopping, Polynesians explored the Pacific long before Europeans crossed the Atlantic. We might get to the stars by steps.

Futurist Schwartz laid out four scenarios of the potential for star travel in the next 300 years, building on three population scenarios. By 2300 there could be 36 billion people, if religious faith drives large families. Or, vast wealth might make small families and long life so much the norm that there are only 2.3 billion people on Earth. One harsh scenario has 9 billion people using up the Earth.

Thus his four starship scenarios... 1) "Stuck in the Mud"---we can't or won't muster the ability to travel far. 2) "God's Galaxy"---the faithful deploy their discipline to mount interstellar missions to carry the Word to the stars; they could handle generational ships. 3) "Escape from a Dying Planet"---to get lots of people to new worlds and new hope would probably require sleep ships. 4) "Trillionaires in Space"---the future likes of Elon Musk, Jeff Bezos, and Richard Branson will have the means and desire to push the envelope all the way, employing relativistic and download ships or even faster-than-light travel.

Schwartz concluded that there are apparently many paths that can get us

to the stars. In other words, "Galactic civilization is almost inevitable."

Adam Steltzner

Beyond Mars, Earth

October 15, 02013 http://longnow.org/seminars/02013/oct/15/beyond-mars-earth/

Summary

Written by Stewart Brand

Mighty daring on Mars

Engineer Steltzner took his rapt audience striding with him through the wrong solutions for landing a one-ton rover on Mars that his team worked through a decade ago. Previous rovers had weighed 50 pounds, 385 pounds. This traveling "Mars Science Laboratory" would weigh 1,984 pounds. The old airbag trick wouldn't work this time, nor would a palette, or legs.

After exhausting everything that looked reasonable but could not work, the team settled on a mini-rocket "sky crane" approach that might be able to work, but there was nothing reasonable-looking about it. Selling the concept, Steltzner invoked arguments such as: "Great works and great follies may be indistinguishable at the outset," while reminding himself that "Sometimes what looks crazy is crazy." To make things worse, the idea could not be tested on Earth, because our atmosphere and gravity situation is so different from Mars, "and simulations only answer things you know to worry about."

Furthermore, the landing had to occur within a tiny target ellipse only 4 by 12 miles in the Gale Crater at the base of Mount Sharp, which stands 15,000 feet about the crater floor. To "kiss the Martian surface" at that spot, the landing system had to go through multiple stages (the "seven minutes of terror") totally on its own, decelerating violently from 10,000 miles per hour to a gentle 0 mph without a single flaw at any stage. On August 6, 2012, with the whole world watching, the system performed perfectly, and Steltzner's team at JPL exploded with high-fives and tears on the world's screens.

After showing the video, Steltzner asked, "Why do it, why spend the $2.5

billion the mission cost?" One eternal question about Mars is whether life is there, or was there. This rover has already determined that Mars once had sufficient amounts of the right kind of water that life could have managed there. "It would have been something bacterial, pond-scummy." He is now at work on a conjectural series of three missions to bring samples of Martian material back to Earth. The first mission would collect and cache the samples; the second would launch the cache to Mars orbit; the third would return it to Earth. Later projects should explore the ice-covered ocean of Jupiter's moon Europa and the methane lakes of Saturn's moon Titan.

"With this kind of exploration," Steltzner said, "we're really asking questions about ourselves. How great is our reach? How grand are we? Exploration of this kind is not practical, but it is essential." He quoted Theodore Roosevelt: "Far better it is to dare mighty things, to win glorious triumphs even though checkered by failure, than to rank with those timid spirits who neither enjoy nor suffer much because they live in the gray twilight that knows neither victory nor defeat."

Steltzner reminded the audience of the relative inhospitability of Mars and the intense inhospitability of space. "Outside of the magnetic field of this planet that shelters us from the streaming radiation of the Sun, it's a really nasty place. It's inconceivably cold or indescribably hot, bathed in radiation." To contemplate terraforming Mars or building colonies in space, he said, makes solving the problems here on Earth of maintaining this planet's exquisite balance for life seem so obvious and doable.

In the harsh lifelessness of space we discover how precious is life on Earth.

Richard Kurin

American History in 101 Objects

November 18, 02013
http://longnow.org/seminars/02013/nov/18/american-history-101-objects/

Summary

Written by Stewart Brand

American objects

Figuratively holding up one museum item after another, Kurin spun tales from them. (The Smithsonian has 137 million objects; he displayed just thirty or so.)

The Burgess Shale shows fossilized soft-tissue creatures ("very early North Americans") from 500 million years ago. The Smithsonian's Giant Magellan Telescope being built in Chile will, when it is completed in 2020, look farther into the universe, and thus farther into the past than any previous telescope---12.8 billion years.

Kurin showed two versions of a portrait of Pocahontas, one later than the other. "You're always interrogating the objects," he noted. In the early image Pocahontas looks dark and Indian; in the later one she looks white and English.

George Washington's uniform is elegant and impressive. He designed it himself to give exactly that impression, so the British would know they were fighting equals.

Benjamin Franklin's walking stick was given to him by the French, who adored his fur cap because it seemed to embody how Americans lived close to nature. The gold top of the stick depicted his fur cap as a "cap of liberty." Kurin observed, "There you have the spirit of America coded in an object."

In 1831 the first locomotive in America, the "John Bull," was assembled from parts sent from England and took up service from New York to Philadelphia at 15 miles per hour. In 1981, the Smithsonian fired up the

John Bull and ran it again along old Georgetown rails. It is viewed by 5 million visitors a year at the American History Museum on the Mall.

The Morse-Vail Telegraph from 1844 originally printed the Morse code messages on paper, but that was abandoned when operators realized they could decode the dots and dashes by ear. In the 1840s Secretary of the Smithsonian Joseph Henry collected weather data by telegraph from 600 "citizen scientists" to create: 1) the first weather maps, 2) the first storm warning system, 3) the first use of crowd-sourcing. The National Weather Service resulted.

Abraham Lincoln was 6 foot 4 inches. His stylish top hat made him a target on battlefields. It had a black band as a permanent sign of mourning for his son Willie, dead at 11. He wore the hat to Ford's Theater on April 14, 1865. When you hold the hat, Kurin said, "you feel the man."

In 1886 the Smithsonian's taxidermist William Temple Hornaday brought one of the few remaining American bison back from Montana to a lawn by the Mall and began a breeding program that eventually grew into The National Zoo. His book, *The Extermination of the American Bison*, is "considered today the first important book of the American conservation movement."

Dorothy's magic slippers in *The Wizard of Oz* are silver in the book but were ruby in the movie (and at the museum) to show off the brand-new Technicolor. The Smithsonian chronicles the advance of technology and also employs it. The next Smithsonian building to open in Washington, near the White House, will feature digital-projection walls, so that every few minutes it is a museum of something else.

Rick Prelinger

Lost Landscapes of San Francisco, 8

December 17, 02013 http://longnow.org/seminars/02013/dec/17/lost-landscapes-san-francisco-8/

Summary

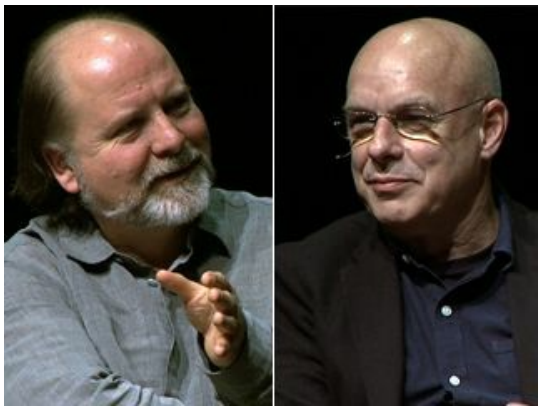
Written by Stewart Brand

Unlost San Francisco life

"You are the soundtrack," Prelinger reminded the 1,400 assembled at the Castro to revel in his eighth mustering of wondrous archival film of San Francisco.

(Long Now people and San Franciscans do love to party, we notice every December at the Castro with Rick. All the more reason to have high expectations for the Long Now Bar (ahem, Salon) under construction at Fort Mason. It will be a non-stop thoughtful party, perhaps lasting centuries, opening in 02014. You can hasten its opening with a contribution.)

Rick's film this time featured the China Clipper taking off from the water next to the World's Fair on Treasure Island; another float plane hopping along the water from Oakland to San Francisco as a ferry; the now outlawed traditional downtown blizzard of calendar pages drifting down from highrise offices celebrating the last day of work every December; the dirt roads of Telegraph Hill leading to Julius' Castle; one of the 80,000 Victory Gardens in the city during World War 2; the bay filled with war ships (no one was supposed to photograph them); a tourist promotion film lauding San Francisco's "invigorating sea mists"; a drive down historic middle Market Street, with the audience crying out a landmark, "There's the Twitter Building!"



Brian Eno, Danny Hillis

The Long Now, now

January 21, 02014 http://longnow.org/seminars/02014/jan/21/long-now-now/

Summary

Written by Stewart Brand

Make the next legal U-turn

"Bitching Betty," they call the robotic voice of the car's GPS guidance system. Eno and Hillis, on their road trips, always become so engrossed in conversation that they get lost—one time, driving to Monterey they wound up in Sacramento, 200 miles wrong. So they turn on GPS, and Betty joins the conversation with helpful advice about U-turns.

Hillis observed, "The GPS is very good at giving you instructions to get someplace. But Brian and I have no idea where we're going; we just want some time together. What usually happens for us after a couple days of frustratingly looking at the tiny GPS map is that we stop and buy a big paper map. And the moment we open a map of Nevada or Arizona, it feels like we're in a much bigger world. The big maps are not that useful to navigate by, but there's a sense of relief of seeing the bigger context and all the possibilities of where we might go. That's exactly what The Long Now Foundation is for."

Culture is a long conversation, Eno proposed. "When I talk about the practice of art I often use the word "conversation" because I think that you never see a piece of art on its own. You look at a painting in relation to the whole conversation of paintings. Some things are completely meaningless outside of that kind of context. if you think about Kazimir Malevich's "White on White" painting, it's hardly a picture actually, but it's an important picture in the history of painting up to that point."

Hillis replied, "My plan for painting is to have my bones removed and replaced with titanium, and then I grind up my bones to make white pigment." Eno: "That's very old-fashioned."

Hillis talked about the long-term stories we live by and how our expectations of the future shape the future, such as our hopes about space travel. Eno said that Mars is too difficult to live on, so what's the point, and Hillis said, "That's short-term thinking. There are three big game-changers going on: globalization, computers, and synthetic biology. (If I were a grad student now, I wouldn't study computer science, I'd study synthetic biology.) I probably wouldn't want to live on Mars in this body, but I could imagine adapting myself so I would want to live on Mars. To me it's pretty inevitable that Earth is just our starting point."

Eno remarked, "Sex, drugs, art, and religion—those are all activities in which you deliberately lose yourself. You stop being you and you let yourself become part of something else. You surrender control. I think surrendering is a great gift that human beings have. One of the experiences of art is relearning and rehearsing surrender properly. And one of the values perhaps of immersing yourself in very long periods of time is losing the sense of yourself as a single focus of the universe and seeing yourself as one small dot on this long line reaching out to the edges of time in each direction."

Hillis described some elements of surrender designed in to the visitor experience of the 10,000-year Clock being built in the mountains of west Texas. "You'll be away from your usual environment for days to travel to the remote site. Because of where it is on the mountain, you have to wake up before dawn, and there's the physical exertion of climbing up the mountain. As you climb, there's some points of confusion, where you're not sure if you're in the right place.

"For example, in the total darkness inside the mountain, as you go up the spiral stairs surrounding the Clock mechanism for hundreds of feet, you think you know where you're going because there's light at the top of the shaft that you're climbing toward, but as you get up there, the stairs keep becoming narrower, and you see they're tapering off to smaller than you could possibly walk on. And you realize, 'My plan isn't going to work.'

"You have to get away from the idea of direct progress and surrender that kind of control in order to find your way."

The Seminars About Long-term Thinking are continuing every month in San Francisco; find out more about the series at http://longnow.org/seminars.